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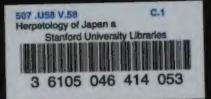
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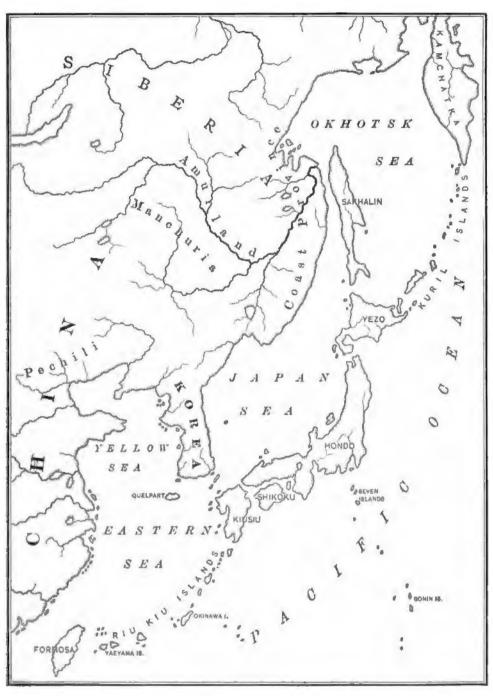












SKETCH MAP OF JAPAN AND ADJACENT TERRITORY.

SMITHSONIAN INSTITUTION UNITED STATES NATIONAL MUSEUM Bulletin 58

HERPETOLOGY OF JAPAN AND ADJACENT TERRITORY

BY

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CURATOR, DIVISION OF REPTILES AND BATRACHIANS



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ADVERTISEMENT.

The scientific publications of the National Museum consist of two series—the *Bulletin* and the *Proceedings*.

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Since 1902 the volumes of the series known as "Contributions from the National Herbarium," and containing papers relating to the botanical collections of the Museum, have been published as bulletins.

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CHARLES D. WALCOTT,

Secretary of the Smithsonian Institution.

WASHINGTON, U. S. A., June 15, 1907.



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PREFACE.

The present work is the result of a critical study of more than 1,500 specimens from Japan and its dependencies, as well as from portions of the adjacent territory on the mainland of eastern Asia. By far the larger number are contained in the herpetological collection of the United States National Museum, and in addition to these I have had here in Washington for direct comparison the extensive collections of the Science College Museum of the Imperial University in Tokyo. For this privilege I wish to express my sincere gratitude to the authorities of the university, and most especially to Prof. Isao Ijima, in whose immediate charge these collections are. Thanks to the kindness of Prof. C. Ishikawa, I have also had some specimens belonging to the Imperial Museum in Tokyo. Moreover, it was my good fortune during two brief visits in Tokyo in 1896 and 1897 to be able to examine there a number of specimens in the two institutions mentioned.

The American museums are not rich in material from the countries covered by this work, but several important specimens are preserved in the museum of the Philadelphia Academy of Sciences, and the collections made by Doctors Furness and Heller in the Riu Kiu Islands are deposited in the Wistar Institute. Philadelphia. A few specimens collected by Mr. Olinger in Korea are in the museum of the State University of Michigan. For permission to study this material, I am greatly indebted to the authorities of these institutions.

It would have been impossible to prepare the present volume without an examination of the important material of types and other specimens contained in the various museums of Europe. I need only mention Leiden, where the material brought home by Buerger and Von Siebold, and upon which Schlegel and Temminck based their account of the reptiles and batrachians in the Fauna Japonica, is preserved, and the British Museum with its vast material and numerous types. It has been my privilege during three visits to Europe to study these and numerous other collections in various cities, and it gives me particular pleasure to acknowledge with sincere thanks the liberality of the authorities of the Smithsonian Institutition and the National Museum in enabling me to undertake these visits for that specific purpose. It was thus possible for me to study the collections in the Hamburg

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XVIII PREFACE.

Museum of Natural History brought home by Lenz, Warburg, and Dieckmann from the Riu Kiu Islands and Amurland; in the Museum Senckenbergianum, Frankfort on the Main, the depository of Bernhard Schmacker's collection from China and the Riu Kiu Islands; in Stockholm's Riksmuseum where are the Japanese collections made by Dr. Osc. Nordquist during the *Vega* expedition; and in the museums of Bergen and Christiania, some highly important collections from Formosa. To the directors and curators of all these institutions I wish to extend my thanks for facilities and assistance received.

The material in the United States National Museum consists of some very important collections. Only a few specimens from the Perry expedition which opened Japan to foreign intercourse are still in existence; there were probably not very many to start with. The next expedition, the Rodgers North Pacific Exploring Expedition, of which Dr. W. Stimpson was the naturalist, secured rather large collections, and these were reported upon by Doctor Hallowell. Unfortunately, he died before the printing of the report, the editing of which was intrusted to Dr. E. D. Cope, then quite young and inexperienced. Many new species were described, but the descriptions were very deficient and the whole publication was marred by numerous serious errors and lapses. A large number of the specimens are lost, many were apparently never returned to the museum, while the few that are left have suffered from neglect and most of them are in poor condition. With their aid, however, and that of Doctor Stimpson's manuscript field catalogue, which is still in existence, I have been enabled to straighten out many dubious questions. Of later noteworthy collections made for the museum, or acquired by it, I may mention the excellent material gathered by my late friend Pierre Louis Jouy in Japan and Korea. Doctor Ferrebee also sent in some specimens from the latter country. During my visit to Japan in 1896, as one of the Fur Seal Commissioners, I was enabled to secure numerous specimens of the commoner species from the surroundings of Yokohama. One of the most extensive and valuable collections of reptiles and batrachians was made by Dr. Hugh M. Smith, United States Deputy Fish Commissioner, in 1901, in southern Japan, especially in the island of Shikoku, hitherto almost unknown herpetologically. Dr. S. Nozawa, of the Agricultural College, Sapporo, has presented to the museum an excellent collection of Yezo reptiles. National Museum acquired from Mr. Alan Owston his splendid collection of Japanese reptiles embracing large series of species from Hondo, the central and southern groups of the Riu Kiu Islands and from Formosa. Finally, the Science College of the Imperial University in Tokyo has presented to the U.S. National Museum a valuable set of duplicates of Japanese and Formosan reptiles.

PREFACE. XIX

The territory embraced in the present work (see Plate I) consists of what is known as Japan proper—i. e., the four main islands and their immediately adjacent islets, the Riu Kiu Archipelago, Formosa, the Bonin Islands, Korea, Sakhalin, Amurland, and the Russian Coast Province, as well as the Chinese provinces of Manchuria and Pechili. A few species, mostly marine snakes, not hitherto recorded from within this territory have been included because of the probability of their occurrence; but these have been inclosed in brackets.

Analytical keys for the easy and sure identification of the groups and species are provided. It must be understood, however, that reptiles and batrachians are often subject to individual variation far in excess of the true specific (or subspecific) and even generic limits. In all cases, therefore, the specimens should be compared with the detailed descriptions. These are not generalized diagnoses, however, but minute descriptions of individuals, the deviations of other specimens under observation being noted under the heading "Variation." In selecting specimens for description or for illustration I have chosen individuals collected inside the territorial limits of this work whenever possible. Preferably the type-specimen has been described, or, if not available, a specimen from the type-locality or from the nearest locality to that of the type. If more than one specimen of this character were available, the one showing the species in its typical and normal development has been selected.

Full synonymy of each genus and species has been given, with references to nearly all the published records of the species within the territorial limits. At the end a bibliography is provided, giving full titles of publications specifically referring to the herpetological fauna of the territory.

Special attention has been given to the geographical distribution of the various forms. Unfortunately, a large number of specimens in the old collections are credited to "Japan," or "Loochoo," or "Formosa," without further particulars, and a good many others have wrong localities attached to them. Much critical work has been done to clear the records in the latter cases. Nevertheless, the range of very many species is as yet only very imperfectly known. Large portions of the territory included are still unexplored, and many islands are as yet unvisited by a scientific collector. With regard to the vertical distribution, it is known only imperfectly in the great majority of cases. To help resident and visiting naturalists remedy these defects in our knowledge this work has been largely undertaken. It was at first intended to accompany this account by a general tabulation of the geographical distribution of the various forms and a full discussion of their origin and dispersal, but this will be treated of by the author in a separate paper.

With regard to the nomenclature of families, genera, and species, the author adheres strictly to the "International Rules of Zoological Nomenclature" adopted by the International Congresses of Zoology.^a Changes in nomenclature necessitated by these rules, therefore, must not be laid to any desire of the author to alter names, but to the necessity of conforming strictly to the laws now generally accepted by the working zoologists of the world. As for my guiding principle in selecting group names higher than families, see pages 48 to 49.

It has not been found expedient to accompany this work by a map of the region giving the various localities mentioned, since good maps of Japan and adjacent territory are newadays easily available. The different names employed in the literature and on the maps for the same localities and the often radically different spelling of the same names have made necessary a synonymical and briefly descriptive list of Japanese localities which will be found at the end of the book.

In the preparation of the present work the author has received kind assistance from many friends and colleagues which he wishes to acknowledge with gratitude. First of all, he must mention his Japanese friends connected with the Imperial University in Tokyo, Professor Mitsukuri, Professor Ijima, Professor Ishikawa, and Mr. Namiye. To Dr. G. A. Boulenger, British Museum; Dr. O. Boettger, Senckenberg Museum; Doctors Kraepelin and Pfeffer, Hamburg Museum; Doctor Jentink, Leiden Museum; Dr. E. Loennberg, Stockholm Museum; Dr. R. Collett, Kristiania Museum; and Messrs. Witmer Stone and Rehn, Philadelphia Academy of Sciences, he is indebted for loan of specimens, much information, and numerous courtesies.

Most of the outline drawings illustrating the text have been prepared by Mr. R. G. Paine.

The plates are mostly reproductions of important illustrations, more or less inaccessible to those for whom this work is chiefly intended. Very often these illustrations represent type-specimens, and in nearly every instance are based on specimens collected in the region covered by this work. The expensive Fauna Japonica is long since out of print, and the reproduction of the best figures from this classic will be welcome to the majority of the students of Japanese herpetology.

For the original drawings of two of the plates (Plates XXXI-XXXII) I am under great obligations to Prof. Isao Ijima.

a Règles Internationales de la Nomenclature Zoologique adoptées par les Congrès Internationaux de Zoologie. (Paris, F. R. de Rudeval, Éditeur, 1905. 8^{vo}. 64 pp.)

HERPETOLOGY OF JAPAN AND ADJACENT TERRITORY.

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INTRODUCTION.

Until a comparatively recent date reptiles and amphibians were generally considered members of the same class, intermediate between the old class Pisces and the birds. True, the Amphibia were elevated to class rank early in the last century, but the proposition was not generally accepted until the subdivision of the vertebrates into Anamnia and Amniota had been gaining ground. It is now generally conceded that the Amphibia, or Batrachia, as they are often called, are more nearly allied to the fishes, and the reptiles more so to the birds than the two classes are among themselves, some authors even going so far, and not without good reasons, as to include the reptiles with the birds in the same class, Monocotylia. Yet, chiefly for the same reasons which cause the Lancelets and the Lampreys to be embraced with the true fishes in the term "ichthyology," the old name for the study of the compound class Amphibia or Reptilia, "herpetology," is still in common use, and in faunistic works, like the present, the two classes are usually treated of together.

Class AMPHIBIA.

- 1758. Amphibia Linnæus, Syst. Nat., 10 ed., I, p. 194.
- 1802. Batrachia Macartney, in Ross's Translat. Cuvier's Lect. Comp. Anat., I, tab. 111.
- 1803. Batrachii Daudin, Hist. Nat. Rept., V, tab. p. 8.
- 1806. Batracii Duméril, Zool. Anal., p. 90.
- 1807. Calamitæ Link, Beschr. Nat. Samml. Rostock, II, p. 53.
- 1813. Achelata Fischer, Zoognosia, 3 ed., I, p. 57.
- 1814. Ranacea WILBRAND, Classif. Thiere, p. 117.
- 1820. Nuda Hemprich, Grundr. Naturg., p. 111.
- 1821. Dipnoa Leuckart, Isis, 1821, Litt. Anz., p. 259.
- 1847. Malacopoda MAYER. Rheinl. und Westphal. Verhandl., VI (p. 177).
- 1855. Psiloderma VANS DER HOEVEN, Handb. Dierk., 2 ed., II, p.—; Handb. Zool., II, p. 251.

The amphibians, or batrachians, as they are also called, are anamniote, archæcraniate, and stomatophysous vertebrates possessing a well-developed skull provided with a lower jaw and articulating with the vertebral column by means of two occipital condyles; limbs, when not atrophied, consisting of humerus or femur followed by two propodials (radius and ulna, tibia and fibula), metapodials (carpals and metacarpals, tarsals and metatarsals), and digits (phalanges); heart with three chambers; internal nares; respiration, at least during part of life, by means of gills; skin naked. Young, usually after leaving egg, undergoes a metamorphosis.

The term "Batrachia," usually applied to this class, has to be rejected and "Amphibia" accepted, since it has been shown that the former name originally applied only to the order of tailless frogs, and that consequently it is a synonym pure and simple of the much older term Salientia.^a

The class includes three recent orders, namely, the Cæcilians (Apoda), the Salamanders (Caudata), and the Frogs (Salienta). Of these only the two latter orders are represented within our present limits.

Order CAUDATA.

- 1806. Caudati Duméril, Zool. Anal., p. 94.
- 1811. Caudata Oppel, Ordn. Rept., p. 72.
- 1813. Urodeli Fischer, Zoognosia, 3 ed., I, p. 58.
- 1820. Gradientia MERREM, Syst. Amph., p. 166.
- 1825. Urodela Latreille, Fam. Nat. Règne Anim., p. 105.
- 1828. Cercopi WAGLER, Isis, 1828, p. 859.
- 1833. Sozura van der Hoeven, Handb. Dierk., II, Pt. 2, p. 304.
- 1835. Homomorpha Fitzinger, Ann. Wien. Mus., I, p. 107.
- 1838. Urophora Hogg, Mag. Nat. Hist. (n. s.), III, p. 270.
- 1855. Saurobatrachi van der Hoeven, Handb. Dierk., 2 ed., II, p. 461.
- 1857. Delesura Jan, Cenni Mus. Milan., p. 54.

This order is often called Urodeles or Urodela, and Duméril (Zoologie Analytique, 1806) is quoted as authority. This is a mistake, however, for Duméril only uses the French term "Urodèles," adding in parentheses the Latin word by which he designates the group, namely, Caudati. From an inspection of page 94 this is plain enough, but to clinch the matter one needs only examine the two indexes at the end of the book, the "Table Française" containing the word "Urodèles" (p. 330), and the "Table Latine" the Caudati (p. 333). The Latin forms "Urodela" and "Urodeles" have been introduced much later by other authors.

This order may be divided into three suborders, viz, the Mudpuppices (Proteida), the Sirens (Meantes), and the true Salamanders (Mutabilia), only the latter being found in the territory here included.

a See Stejneger, Science (n. s.), XX, Dec. 30, 1904, pp. 924-925.

Suborder MUTABILIA.

- 1820. Mutabilia MERREM, Syst. Amph., p. 166.
- 1820. Salamandræ Goldfusz, Handb. Zool., II, p. 129.
- 1828. Morphuromolgæi RITGEN, Nova Acta Acad. Leop. Carol., XIV, p. 277.
- 1828. Molgæ Ritgen, Nova Acta Acad. Leop. Carol., XIV, p. 277.
- 1832. Derotremata+Salamandrina MUELLER, Isis, 1832 (p. 504).
- 1831. Urodela Bonaparte, Saggio Distrib. Met., p. 77.
- 1840. Deiretremata+Aphanobranchiata Leuckart, Froriep's Neue Notizen, XIII, p. 20.
- 1866. Sozura HAECKEL, Gen. Morphol., II, p. CXXXI.
- 1866. Caducibranchiata COPE, Journ. Phila. Acad. Sci., VI, Pt. 1, p. 102.
- 1889. Pseudosauria Cope, Amer. Natural., XXIII, 1889, p. 861.

In the true salamanders we recognize two superfamilies, viz, the Amphiumoideæ and the Salamandroideæ. For our present purpose it is enough to separate them by the presence of well-developed eyelids in the latter and the absence of eyelids in the former. It is stated that the absence of eyelids is concurrent with the absence of a first epibranchial and with the connection of stapes with the quadrate arch in the Amphiumoideæ, while in the Salamandroideæ a first epibranchial is present and stapes not connected with the quadrate arch in the adult. The Amphiumoideæ correspond to Cope's Trematodera and Amphiumoidea, and to Boulenger's Amphiumidæ, while the Salamandroideæ are the latter's Salamandridæ and Cope's Pseudosauria (1889, N. Am. Batr., p. 33; not of 1898, Syllabus, p. 48, where the term corresponds strictly to our Mutabilia).

Both superfamilies occur within our limits. The genera which belong to them may be referred to their respective groups as follows:

ANALYTICAL KEY TO FAMILIES.

Superfamily AMPHIUMOIDEÆ.

Two families compose the superfamily Amphiumoideæ, the Amphiumidæ and the Cryptobranchidæ, differing in many anatomical characters, the former represented by the eel-like Amphiuma with at most three digits on the rudimentary legs, the latter by the hellbender, with its more salamander-like body, 4–5 digits and well-developed limbs. The former occurs only in North America.

Family CRYPTOBRANCHIDÆ.

This family embraces three genera, Proteocordylus (Andrias), known only from the miocene of western Europe, Cryptobranchus, which only

occurs in eastern North America, and Megalobatrachus, known from Japan and China. They are so closely allied that osteologists and paleontologists prefer to regard the two latter at least as congeneric, but the closing of the branchial fissure in the adult Megalobatrachus seems to be sufficient reason for adopting the latter genus. In the American genus the fissure remains open throughout life.

Genus MEGALOBATRACHUSª Tschudi.

1837. Megalobatrachus Tschudi, Neues Jahrb. Mineral. Geol. Palæont., (Stuttgart) 1837, Pt. 5, September, p. 547 (type, M. sieboldi).

1838. Sieboldia Bonaparte in Gray, Ann. Mag. Nat. Hist., May, 1838, p. 413 (same type).

1838. Sieboldtia Agassız, in Anhang to Tschudi's Classif. Batr. (err. typogr.).

1840. Hydrosalamandra Leuckart Froriep's Neue Notizen, XIII, No. 2, Jan. 1840, p. 20 (same type).

1854. Tritomegas Duméril and Bibron, Erpét. Gén., IX, p. 163 (same type).

1904. Sieboldiana Ishikawa, Proc. Nat. Hist. Tokyo Imp. Mus., I, No. 2, p. 21 (emendation).

Unless it can be shown that Bonaparte published his Sieboldia before September, 1837, it will have to give way to Tschudi's Megalobatrachus. Agassiz (l. c.), on September 29, 1838, speaks of "the established priority" of the former, but, like many later authors, he evidently regarded Megalobatrachus as first proposed by Tschudi in his "Classification der Batrachier," which Agassiz himself published in October, 1838. As will be seen from the above synonymy Tschudi had already published it in September, 1837, a fact of which Agassiz was apparently unaware.

Few animals can boast such an extensive literature as the Japanese giant salamander. The bibliography attached to this work and the synonymic list of quotations under the head of the species, greatly defective as they are, give a fair indication of the interest this animal and especially its anatomy has aroused among naturalists. It is only recently, however, that accurate and detailed observations on its habits and propagation have been made. A good account based upon ample experience in the field has been published by Prof. C. Sasaki, and recently Prof. C. Ishikawa has supplemented his notes by very important observations on the eggs and newly hatched young. Finally, Dr. C. Kerbert, in Amsterdam, has succeeded in making the giant salamander breed in captivity, thus being able to follow the process from the laying of the eggs to the hatching of the larvæ and their subsequent growth and change. A brief summary of their observations may be included here. According to them the giant

^a From $\mu \epsilon \gamma \dot{\alpha} \lambda o \epsilon = \mu \dot{\epsilon} \gamma \dot{\alpha} \epsilon$, great; $\beta \dot{\alpha} \tau \rho \dot{\alpha} \chi o \epsilon$, frog, or, in this case, batrachian.

b" Die constatirte Priorität seines Namens Sieboldtia."

c Journ. Coll. Sci. Tokyo, I, Pt. 3, 1887, pp. 269-274.

d Proc. Nat. Hist. Tokyo Imp. Mus., I, No. 2, 1904, pp. 19-37.

salamander inhabits high mountain valleys, where it frequents the swiftrunning brooks of clear cold water from the mountain springs. streams are quite shallow, have stony beds, seldom attain a width of more than a few meters and are for the most part shaded with shrubs and trees. The temperature of the water in the middle of August was found to be between 17° and 23° C. Here they keep themselves habitually in dark holes under rocks, along the banks or the middle of the stream, and cavities inhabited by one of these animals may be recognized by the bottom at the entrance being kept clean. feed on fishes, frogs, crustaceans, earthworms, etc, and are easily captured by a baited fishhook thrust into the retreat of the sluggish animal. The flesh, which is eaten by the Japanese, is said to be delicious, and is also used for medicinal purposes. Another mode of capturing the salamander during the breeding season is to throw into the stream a strong-smelling mixture of various animal ingredients made into small balls, thereby enticing the animals out of their holes. As a result, the "hanzaki" is constantly becoming scarcer. Only the smaller and medium-sized individuals stay in the small, shallow streams, the big old monsters of 3 feet and more seek deeper water lower down. The eggs are deposited in August and September in the deep holes. They vary as to size and number according to the size of the female, and consist of an outer gelatinous envelope or capsule 16 to 20 mm. long, in which the spheroid egg floats in a clear fluid. Each capsule is connected with the next by means of a comparatively short string about equaling the length of the larger axis of the embryo, the whole deposit resembling a rosary in form. Kerbert estimates the number of eggs deposited by the female in the Amsterdam Aquarium at about 500. Ishikawa found 60 to 80 in the various holes examined by him. The entire development from the deposition of the eggs to the escape of the larva from the capsule lasted in captivity from fifty-two to sixty-eight days, the escaping larvæ measuring about 30 mm. in length. At this time they have external gills; the anterior extremities show indications of two fingers and the posterior limbs are indicated; the mouth which is still plainly ventral becomes gradually terminal. The gills seem to disappear when the young are between 200 and 250 mm. in length. Both Ishikawa and Kerbert maintain that the adult animal takes care of the eggs, wrapping the egg string around itself and by its movements keeping the mass in motion so as to facilitate the respiration process of the eggs and embryos; but they differ in opinion as to whether it is the male or the female who thus undertakes the care of the offspring, Ishikawa from observations in nature maintaining the latter, Kerbert from the behavior of the animals in the aquarium the former.

MEGALOBATRACHUS JAPONICUS a (Temminck).

HANZAKI (Ishikawa).

- 1837. Triton japonicus Temminck, Fauna Japon., Pt. 3, Coup d'œil, p. xxvi (Japan):—Wagner, Muenchen Gelehrte Anzeiger, V, July 8, 1837, p. 55.— VAN DER HOEVEN, Tijdschr. Natuurl. Geschied., IV, Feb. 1838, p. 375.— Cryptobranchus japonicus van der Hoeven, Tijdschr. Natuurl. Geschied., IV, Feb. 1838, p. 384, pl. va, figs. 5-6 (Japan); Bull. Sci. Phys. Natur. Néerlande (Leiden), 1838, p. 91; Proc. Zool. Soc. London, 1838, p. 25; Ann. Mag. Nat. Hist., II, Nov. 1838, p. 230; Ann. Sci. Nat., (2) Zool., XI, 1839 (p. 63); Mém. Soc. Hist. Nat. Strasbourg, III, 1840, author's separate, p. 11, pls. —; Ann. Sci. Nat., (2) Zool., XV, 1841, p. 251 (151 by typogr. err.); Tijdschr. Natuurl. Geschied., VIII, 1841, p. 270 (blood corpuscles). —Schmidt, Goddard, and van der Hoeven, Nat. Verh. Maatsch. Wet. Haarlem, XIX, 1862, p. 3 (anatomy).—Hyrtl, De Cryptobr. Jap., 1865, p. 9 (descr.; anat.).—Rein and von Roretz, Zool. Garten, XVII, 1876, p. 33, pl. — (distrib.; habits, etc.).—Boettger, Zool. Garten, XVII, 1876, p. 432 (young).—Dambeck, Natur (Halle) (n. s.), III, 1877, (p. 685).— Wiedersheim, Kopfskel. Urodel., 1877, p. 56, pl. 11, figs. 21-22 (skull).— Cornalia, Atti. Soc. Ital. Sci., XXI, 1878, p. 207 (dimensions).—Hil-GENDORF, Sitz. Ber. Naturf. Freunde, Berlin, 1880, p. 121.—BIELETSKI, [Rem. Physiol. Sal. Gig., 1882] p. — pl.—.—Geerts, Nouv. Arch. Mus. Paris, (2) V, 1883, p. 274, pl. xvu.—Rein, Japan, Engl. ed., 1884, p. 188 (Hida to Iwami).—Sasaki, Journ. Coll. Sci. Tokyo, I, Pt. 3, 1887, p. 269 (Iga; Ise; Yamato; habits, eggs, etc.).—Moesch, Neujahrsblatt Naturf. Ges. Zuerich, 1887, p. 1, figs. 1-4 (full fig. and skel.).—Fritze, Mitth. Deutsch. Ges. Ost-Asiens, V, 1891, p. 239 (absent in Yezo).—MEURON, Bull. Soc. Sci. Nat. Neuchâtel, XXI, 1893, p. 186.—Gadow, Cambr. Nat. Hist., VIII, 1901, p. 98 (fig.).—Osawa, Mitth. Med. Fac. Univers. Tokio, V, no. 4, 1902 (pp. 221-427+44 pls.) (anatomy).—Andrias japonicus LAP-PARENT, Traité Geol., 4 ed., 1900, p. 1532.—Megalobatrachus japonicus BEDDARD, Proc. Zool. Soc. London, 1903, II, Pt. 2 (publ. Apr. 1904) p. 298 (anatomy).
- 1837. Megalobatrachus sieboldi Tschudi, Neues Jahrb. Mineral. Geol. Palæont., 1837, Pt. 5, Sept., p. 547 (type-locality, Japan; type in Leiden Mus.; Siebold collector); Classif. Batr., Oct. 1838, p. 96, pl. vi (Japan).—Martens, Preuss. Exped. Ost-Asien, Zool., I, 1876, p. 384 (southern Japan).—
 Tritomegas sieboldii Duméril and Bibron, Erpét. Gén., IX, 1854, p. 164.—Bleeker, Natuurl. Tijdschr. Nederland. Indië, XVI, 1858, p. 205.
- 1837. Salamandra maxima Schlegel in Tschudi, Neues Jahrb. Mineral. Geol. Palæont., 1837, Pt. 5, Sept., p. 546 (not of Barton, 1808); Fauna Japon. Rept., pp. 127, 139, Saur. et Batr., pls. vi, vii, viii (type-locality, "Suzuga yama near Sakanosta", 6 Okude mountains).—Siebold, Fauna Japon., Rept., 1838, p. xv.—Pompe van Meerdervoort, Natuurk. Tijdschr. Nederland. Indië, XX, Pts. 4-6, 1860, p. 386.—Sieboldia maxima Gray, Cat. Batr. Grad. Brit. Mus., 1850, p. 52 (Japan).—Phisalix, Compt. Rend. Acad. Sci. Paris, CXXV, 1897 (p. 121) (poisonous secretions); Bull. Mus. Hist. Nat. Paris, 1897 (p. 242).—Megalobatrachus maximus Boulenger, Cat. Batr. Grad. Brit. Mus., 1882, p. 80 (Japan).—Okada, Cat.

a Signifying Japanese.

b Evidently Sudsaka Yama near Sakanoshita, of Hassenstein's Atlas of Japan, the mountain where the boundaries between the provinces of Iga, Ise, and Imi meet.

Vert. Japan, 1891, p. 65 (Mimasaku; Ise; Iga; Hida; Mino; Ivami; Tamba; Tajima).—Boettger, Kat. Batr. Mus. Senckenberg., 1892, p. 60 (Iga).—Andres, Atti Soc. Ital. Sci. Nat., XXXV, fasc. 3-4, 1896, p. 201, pl. 1 (descr.; general).—Schnee, Natur und Haus, VIII, 1900 (p. 246) (notes on living spec.).—Ishikawa, Mitth. Deutsch. Ges. Ost-Asiens, IX, Pt. 1, 1902, p. 81 (Hondo from Mino to Suwo and Nagato; habits, propagation, etc.); Proc. Nat. Hist. Tokyo Imp. Mus.. I, No. 2, 1904, p. 19, pls, viii-xi (general; distrib.; propag.; develop.).—Kerbert, Tijdschr. Nederland. Dierk. Vereen. (2), VIII, 1903 (pp. xxviii-xxix) (eggs); Zool. Anz., XXVII, 1904, Feb. 23, p. 305 (propagation, etc.); Compt. Rend. Sixth Int. Zool. Congr. Berne, 1904, (1905) p. 463 (propagation).—Cryptobranchus maximus Chapman, Proc. Phila. Acad., 1893, p. 227 (anat.).

1840. Hydrosalamandra siboldi Leuckart, Froriep's Neue Notizen, XIII, p. 20 (err. typ.).

1854. Salamandra gigas "Schlegel" Duméril and Bibron, Erpét. Gén., IX, p. 164 (lapsus.).

1854. Tritomegus sieboldtii Duméril and Bibron, Erpét. Gén., IX, p. 426 (err. typ.).

1907. Cryptobranchus sieboldia Calmette, Les Venins, p. 330, fig. 123.

The above quotations refer to Japanese specimens. A Sieboldia davidiana has been described by Blanchard from China, which Boulenger, however, regards as identical with the Japanese species. I have no means of verifying this identification. P. Krefft (in Verh. Ges. Deutsch. Naturf. Aerzte, 69 Vers. Braunschw., 1897, II, Pt. 1, 1898, p. 187) treats of specimens believed to be from Amoy and Canton, and refers them "auf Grund allerdings oberflächlicher Untersuchung" to Cryptobranchus japonicus. Gray, in 1873 (Ann. Mag. Nat. Hist. (4), XII, 1873, p. 188) mentions a skin including the bones of head and feet sent by Swinhoe from Shanghai, which he could not distinguish from a Japanese specimen.

There has been almost as much confusion about the specific name of the giant salamander as there has been with the generic term.

The oldest name is Temminck's *Triton japonicus*, which was published in his "Coup d'oeil," the introductory chapter to the Fauna Japonica, probably as early as March or April, 1837, and certainly not later than June of that year (see Bibliography, p. 542). In that paper which was penned as early as November, 1835, Temminck described the giant salamander sufficiently to give the name *Triton japonicus* a status in zoological nomenclature.

Description.—Half grown; U.S.N.M. No. 11349; Japan; Prof. E. S. Morse, collector. Vomerine teeth in an arched series between the

^a Compt. Rend. Acad. Paris, LXXIII, 1871, p. 79.—Gray, Ann. Mag. Nat. Hist. (4), XII, 1873, p. 188.—Sieboldia davidi David, Journ. Trois. Voy. Emp. Chinois, II, 1875, p. 20 (emendation) (S. W. Shensi).

b La Salamandre gigantesque, Triton japonicus porte des formes bizarres: une tête extremement large et deprimée, un corps applati muni d'une queue en forme de large aviron, le tout porté par des pieds très-courts; elle vit dans les eaux limpides des torrens. Coup d'oeil, p. xxvi.

choanæ, parallel with the maxillary and premaxillary series; whole body strongly depressed except terminal two-thirds of tail which is strongly compressed; head broad, flat; nostrils anterior, near the tip of the snout and the lips, their distance from each other less than one-half the distance between the eyes, which are without eyelids and very small, their diameter being less than one-tenth of the distance between them; legs short, depressed; fore legs with four fingers slightly webbed at base, the outer one with an outer dermal fold which continues along the entire length of the arm; hind feet with five toes webbed at base, the two outer ones with a distinct dermal flap on the outer side; a broad cutaneous expansion on the posterior aspect of the leg; tail short, slightly more than one-third the length of head and body, compressed, with a high dorsal fin beginning at the insertion of the hind legs, and a much lower ventral fin; a strong lateral fold on the neck from behind the angle of mouth to above the shoulder; another prominent'undulating lateral dermal fold from the axilla to above the hind legs; skin rough, with numerous grooves, transverse on underside of body and on the sides, longitudinal on the throat; head above covered with closely set round tubercles which are somewhat smaller than the eyes, but not arranged with any degree of regularity or symmetry; lips, tips of snout, and a limited area along the median line of the top of head comparatively smooth; similar tubercles, though more scattered on sides of throat and on upper side of neck, a few occurring irregularly along the entire side of the body above the lateral fold. Color (in alcohol) burnt umber in various shades, paler below, irregularly blotched and marbled with dusky spots, limbs similarly spotted, tips of digits light orange brown.

Total length. 490 Tip of snout to vent. 322 Anterior border of vent to tip of tail 168 Width of head. 69 Distance between eyes. 40 Fore legs. 52 Hind legs. 59 Greatest height of tail. 48

Few salamanders have been oftener described in detail, or oftener figured than the present species as will be seen from the synonymy given above, where ample references are cited. A more detailed description therefore seems superfluous. It may be added, however, that there is no apparent external difference between the sexes, except that during the breeding season the borders of the vent are swollen in the male, but flat in the female. The young ones differ chiefly in being less rough and lighter in color.

Habitat.—The giant salamander of Japan seems to be restricted to the higher altitudes of the island of Hondo west of longitude 137° 30′ east of Greenwich. Rein states that it lives in clear running mountain streams in the granite and schist ranges, at a height of from 400 to 1,000 meters above the sea, while Geerts mentions 200 to 800 meters as its true habitat. According to these two authorities the principal localities where it is found are as follows:

- 1. The mountain streams and sources of the Yodogawa and Lake Biwa drainage, especially the tributaries of the Kidzugawa in the provinces of Iga, Yamato, and western Ise. The type-specimen—which von Siebold brought home alive to the Leiden Museum—was taken in this district, namely, in one of the streams of Sudzaka Yama, the mountain where the boundaries of the three provinces of Ise, Iga, and Omi meet, and Mr. Sasaki, who, in 1880 and 1881, visited this part of Japan in search of this species, obtained all his specimens (71) in Iga, Ise, and Yamato.
- 2. The streams of the border mountains between Hida and Mino provinces, especially the sources and tributaries of Rokagawa. Mr. Geerts quotes Keisuke Ito (Nihon Sanbutu Si, II, p. 39) as authority for the statement that it occurs in the province of Owari, though judging from the maps accessible to me it seems doubtful whether there are any localities high enough in that province.
- 3. The streams on the watershed between the districts of Sanindo and Sanyodo. Geerts mentions several streams by name, such as Miyadugawa and Itigawa, in the province of Tamba, Toyokagawa, in Tazima, and Osakigawa in Mimasaku and Harima, while Rein also mentions the province of Iwami. Okada likewise names the province of Iwami, in addition to those of Mimasaku, Tamba, Tajima, Ise, Iga, Mino, and Hida, but upon what authority I do not know.

Professor Ishikawa, in a lecture given before the German East Asiatic Society in Tokyo, 1900,^a gives the distribution of the giant salamander as follows: Mountain streams in the lower half of Hondo, i. e., from Mino to Iwami, Nagato, and Suwo. The species is consequently to be found in the mountain chain southwest from Mino to Suwo and Nagato, and also in the mountains of Iga and Ise, a branch of the main mountain chain. With regard to the provinces in which it occurs, the following are to be mentioned: Mino, Omi, Iga, Ise, Tamba, Tango, Tajima, Inaba, Mimasaku, Harima, Hoki, Bizen, Bitchu, Bingo, Idzumo, Iwami, Aki, Suwo, and Nagato. It has not been found as yet in Kii nor in Shikoku or Kiusiu. It occurs most frequently, so far as now known, in the mountain streams which come from the famous volcano Daisen, and in the streams on the south side of the Hiruzen Mountains and their neighborhood, espe-

a Mitth. Deutsch. Ges. Ost-Asiens, IX, p. 79.

cially in the sources of the rapid Asahigawa or river of the rising sun. For many years he collected the "hanzaki" in this part of the island, and he mentions the localities of Tsuyama, Onaru Valley, Kuginuki Valley, Mikamo, Maniwagori, all apparently in western Mimasaku. To his very interesting article, Contributions to the Knowledge of the Giant Salamander, in the Proceedings of the Department of Natural History, Tokyo Imperial Museum, I, 1904, he has added a colored map (Plate VIII) showing the distribution of the species. In this map the extension westward to the provinces of Nagato and Suwo is shown, and it also includes a large portion of the province of Idzumo. The text affords, however, no opportunity of judging upon what material this is based. This is particularly unfortunate as the testimony as to the occurrence of this species so far west is quite conflicting. According to a memorandum kindly furnished me by Dr. Hugh M. Smith, he was informed by Dr. T. Kitahara, zoologist of the Imperial Japanese Fisheries Bureau in Tokyo, that the western limit is the province of Bingo. The main drainage of the provinces of Tamba, Tazima, and Iwami is toward the Sea of Japan, the others drain to the inland sea, or to the Pacific, but the maps accessible to me are not accurate and detailed enough to decide whether some of the upper valleys of Iwami and Tazima do not in reality drain southward to the Inland Sea. At any rate it can not be taken for granted that the giant salamander occurs north of the watershed until its occurrence in streams of the Sea of Japan drainage is proven beyond a shadow of a doubt by actual specimens.

In this connection it may be added that, according to Doctor Smith's memorandum alluded to above, "Mr. I. Shishido, teacher of zoology in the Third High School, Kyoto, states that the species is reported from near Funatsa, province of Hida, in a river flowing into the Japan Sea (Toyama Bay), but no specimens from that locality are known to be in collections. The people in the vicinity of Funatsu, especially thewomen, eat this animal as a medicine." It is of the greatest importance that this question, whether the giant salamander occurs originally (not introduced) and regularly in the Japan Sea drainage, should be definitely solved. The qualification "regularly" is added because an isolated occurrence would not be convincing, since it might be explained either as an accidental introduction, or as the result of a Japan Sea stream having captured the sources of a Pacific Coast stream.

The capture of specimens in the Takadagawa, province of Musashi, and at Kyoto, in 1832, in the canal of the castle Nizyono siro, as related by Handangensei (Keisuke Ito.^a) probably refers to animals escaped from captivity or deliberately transplanted.

a Nihon Sanbutu, Sci. 11, p. 39.

List of specimens of Megalobatrachus japonicus.

U. S. N. M. No.	Age.	Locality.	When collected.	By whom collected or from whom received.
6163	Young	Japan		Colonel Taylor.
6543	do	do	:	C. E. Smidt.
11349	Half grown a.	do		E. S. Morse.
34214	Adult b	Province Mino		A. Owston.
34215	do	do	•••••	Do.
34216	do	do		Do.
34217	do	do	•••••	Do.
		l		•

a Description, p. 7.

618 mm. long.

Superfamily SALAMANDROIDEÆ.

The Salamandroids fall into three families, namely, the Ambystomidæ, Plethodontidæ, and Salamandridæ. The Plethodontidæ are characterized by the presence of parasphenoid teeth. They do not occur within our area, being confined, with one exception, to the New World.

The two families found in Japanese territory may be distinguished as follows:

KEY TO FAMILIES.

- a² Vomero-palatines not prolonged backward over the parasphenoid, the teeth placed on the posterior margin in transverse or posteriorly converging series.

AMBYSTOMIDÆ, p. 24:

Family SALAMANDRIDÆ.

The salamanders, with the vomero-palatine teeth extending far backward in two parallel or posteriorly diverging series, are characteristic of the palearctic region, especially the Mediterranean subdivision. Three genera only occur in eastern Asia, two of which have been found within our territory. Of these, one, *Diemictylus*, extends into North America.

The Japanese genera may be distinguished as follows:

KEY TO GENERA.

Genus TYLOTOTRITON a Anderson.

- 1871. Tylototriton Anderson, Proc. Zool. Soc. London, 1871, p. 423 (type, T. verrucosus).
- 1885. Tylotriton Boettger, Offenbach. Ver. Naturk. 24-25 Ber., p. 165 (emendation).
- 1889. Glossolega Cope, Bull. U. S. Nat. Mus., No. 34, p. 201 (in part).

Thus far only two species of this genus are known, namely, T. verrucosus, which is known from the eastern Himalayas to the mountains of Yunnan, and the present species, which has been found only in Okinawa Shima. Doctor Anderson has given a detailed description, with illustrations, of the anatomy of the type species.

The nearest related genus appears to be *Pleurodeles*, the only species of which, *P. waltl*, is confined to the southwestern portion of the Pyrenean peninsula and the northern portion of Morocco. The two genera agree not only in the singularly pointed ribs protruding through the sides of the body, sometimes even perforating the skin, but also in the forward extension of the vomero-palatine teeth.

The present distribution of these forms—one in Spain, one in the Himalayan region, and one in the Riu Kiu Archipelago—is suggestive of the antiquity of this type of urodeles.

TYLOTOTRITON ANDERSONI c Boulenger.

1892. Tylototriton andersoni Boulenger, Ann. Mag. Nat. Hist. (6), X, Oct. 1892, p. 304 (type-locality, Okinawa, Riu Kiu; type, Brit. Mus. No. 92. 9. 3. 30; Holst, collector).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 865; author's separate p. 16.—Boettger, Offenbach. Ver. Naturk., 33-36 Ber., 1895, p. 107 (Okinawa).

Description.—Adult; Sci. Coll. Tokyo, No. 67; Okinawa (figs. 1-6). Vomero-palatine teeth in two longitudinal series, meeting in front and commencing some distance anterior to a line through the anterior border of the choanæ, then proceeding backward nearly parallel, but considerable distance apart, then at the beginning of the posterior third sharply diverging; tongue nearly circular, its diameter more than half the width of the mouth, extensively free on the sides, less behind and least in front; nostrils near the tip of the snout, and half-way between the top and the edge of the lip, their distance from each

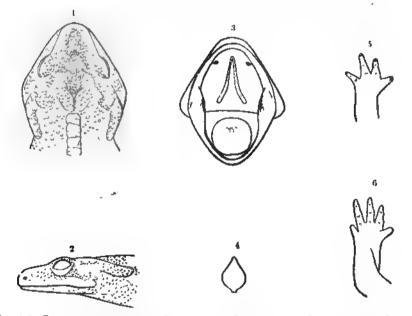
'n

a From "τυλωτός, knobbed." "Along the body a lateral line of equidistant, large, rounded, knob-like, porous, glandular tubercles, terminating at the root of the tail. The second to fifth epipleural processes and the extremities of the remaining ribs terminate in the knob-like lateral glands." Anderson, Proc. Zool. Soc. London, 1871, p. 423.

b Zool. Res. Yunnan, p. 848, pl. LXXVII.

c"Named after Dr. J. Anderson, to whom science is indebted for the discovery of the remarkable newt on which he established the genus *Tylototriton* in 1871." John Anderson was born in Edinburgh, October 4, 1833; superintendent of Indian Museum, Calcutta, from 1865 to 1886; then occupied with the study of the fauna of Egypt till his death on August 15, 1900. He visited Japan in 1884.

other greater than their distance from the eye, but smaller than the interorbital space; upper eyelid small, its width less than one-third the interorbital space; top of head surrounded on the sides and anteriorly by a rather rough, bony crest which covers the tip of the snout, canthus rostralis, supraorbital edge, and fronto-squamosal arch; parotoid gland scarcely as long as the width of the interorbital space, narrow, rather prominent; distance from tip of snout to gular fold contained less than three times in distance from gular fold to vent; fingers and toes interdigitating when legs are pressed against the sides of the body; a rough, bony ridge, similar to the one on the head, along the middle of the back, from occiput to the tail and continuous with the upper ridge of the latter: from the shoulder to the side of



Figs. 1-6.—Tylototriton andersoni 1½ × nat. size. 1, top of head; 2, side of head; 3, open mouth; 4, section of tall at end of basal third; 5, hand; 6, foot. No. 67, Sci. Coll., Tokyo.

the tail a dorso-lateral series of knob-like glands on the body terminating the pointed end of the ribs, which protrude as hard spines, though not perforating the skin; this series continues some distance on the side of the tail, on which it gradually disappears; between this series and the median dorsal ridge another series of prominent, conical, bony knobs, about eight on each side, each one located over a rib and connected along the latter with the terminal rib knob by a series of smaller, less conspicuous, tubercles; fingers and toes rather short, depressed, with indication of a slight web at the base; fifth toe very short, rudimentary on the right foot, entirely missing on the left; no metacarpal or metatarsal tubercles; tail compressed, tapering from

the base, ending in a blunt point, upper and lower edge compressed, ridge-like; vent a short longitudinal slit with transverse folds or papillæ along the edges which are not raised or swollen; gular fold a slight depression; the whole body, including throat and legs above and below roughly granulated or tuberculated, the only smooth places being the lips, underside of hands and feet, and the lower edge of the tail. Color (in alcohol) above and below dark "mummy-brown," the bony ridges on head and back, as well as the two series of knobs on each side of the back, pale, like old ivory; underside of hands and feet, as well as lower edge of tail, yellowish.

Dimensions.

	mm.
Total length	159
Tip of snout to gular fold	
Gular fold to anterior angle of vent	61
Anterior angle of vent to tip of tail	
Width of head	21.5
Fore leg	25
Hind leg	27
Height of tail in the middle	6

Variation.—The specimen described above being only the second one known, it is obviously impossible to indicate the extent of individual variation in this species or even of sexual differences, as both specimens appear to be females. There are several points in which the two specimens differ, however. Thus, in the type the vomero-palatine series of teeth converge somewhat about the middle before the final flaring divergence. In the proportions there is, moreover, this difference, that in the type the tip of the toes reaches the elbow of the fore leg when the legs are pressed against the side; the length of the tail of the type is also proportionally greater. That the type is said to have an oval tongue and to be of a black color are differences of but slight consequence, but it is rather remarkable that the type does not appear to have the inner row of dorsal knobs differentiated to such a degree as to call for special mention in the original description.

Habitat.—The type of this species was discovered by Mr. Holst in Okinawa Shima, in 1892, and is in the British Museum. A second specimen, the one described above, belongs to the Science College Museum in Tokyo, the only ones thus far on record. This latter specimen is from the same locality as the type.

List of specimens of Tylototriton andersoni.

Museum.	No.	Sex and age.	Locality.	When col- lected.	By whom colliected.
Sci. Coll. Tokyo	67	Adult fem.a	Okinawa shima		

Genus DIEMICTYLUS a Rafinesque.

- 1820. Diemictylus Rafinesque, Annals of Nature, 1820, No. 1, p. 5 (type, T. viridescens).
- 1820. Notophthalmus Rafinesque, Annals of Nature, 1820, No. 1, p. 5 (type, T. miniatus).
- 1838. Cynops Tschudi, Classif. Batr., p. 94 (type, C. subcristatus).
- 1850. Taricha Gray, Cat. Batr. Grad. Brit. Mus., p. 25 (type, T. torosa).
- 1858. Diemyctylus Hallowell, Journ. Phila. Acad. (2), III, p. 362 (emendation).
- 1878. Triturus Boulenger, Bull. Soc. Zool. France, III, p. 307 (type, T. viridescens) (not of Rafinesque, 1815).
- 1879. Pelonectes Lataste, Rev. Internat. Sci., III (p. 275), (type, P. boscai) (not of Fitzinger, 1843).

Professor Cope (Bull. U. S. Nat. Mus., No. 34, p. 203) has raised the question whether Rafinesque's Diemictylus has the priority over Merrem's Molge or not, both having been proposed in 1820. The question is immaterial, however, since Molge is a strict synonym of Triturus, Rafinesque (1815), both the latter names being assuredly only substitute names for Triton, preoccupied; hence they are in every respect identical and can not be used independently for different sections of the original genus Triton. Molge can never be used unless Triturus should become unavailable for some reason not now apparent. To the latter belong the species without a bony fronto-squamosal arch.

Two species of *Diemictylus* occur in Japan, one peculiar to Kiusiu, Hondo, and Shikoku, the other confined to the northern and central The latter is a broader-headed form with shorter digits Riu Kius. and longer tail, and Boulenger also indicates certain differences in the coloration of the live animals. The structural differences are very difficult to express in definite terms on account of the sexual and individual variability of these forms. It appears that the males have relatively longer digits than the females; consequently, in the female D. pyrrhogaster the digits are of about the same relative length as in the male D. ensicauda. On the other hand, the length of the tail—though undoubtedly averaging considerably longer in D. ensicauda—varies to such an extent individually as to baffle all my attempts at using it diagnostically. The head of the latter is also decidedly larger, but the variability of the other proportions renders the use of it illusory as a unit for comparative measurements. Nevertheless, the two forms are quite distinct, and it may be that a larger series of D. ensicauda in good condition (many of my specimens being rather hard and dry) will yield better results in the future.

^a Derivation and meaning obscure. Two derivations suggest themselves, namely, διαμυκτος, from διαμιγνυμι, or δι-ἡμικοτυλος, but the application of neither is obvious.

In the meantime the following key must suffice:

REY TO DEFINE SEPTEMBER OF DIEMBERYLUS.

digit-blacked.

at Head smaller, digit-leger tailed for other in life, underneath red, undersided digit-blacked.

10. pyrrhogaster, p. 16.

at Head larger: ligit-degree tailed for other in life, underneath, including under-

12 Head larger: lighted, for the lighter; color in life, underneath, including underside of digital yell with.

DIEMICTYLUS PYRRHOGASTER " Boie).

IMORI

Plate II.

1826. Molo pyrchogoste Bott. I-18, 1826. p. 215 type-locality. Japan; Blomhoff, collector : Bijdr Natuurk, Wetensch., H. Pt. 1, 1827, p. 27.— Molge pyrdogust a Ben Lenger, Cat. Batr. Grad. Brit. Mus., 1882, p.19 (Nagasaki; Kiukiang Mr., China .- Okara, Cat. Vert. Jap., 1891, p. 65 (Tokyo; Kyoto; Kaga: Suwo :- Boettoen, Offenbach, Ver. Naturk, 26-28 Ber., 1888, p. 101; Kat. Batr. Mus. Senckenberg., 1892, p. 56 (Yokohama; Nagasaki).-Schaten, List Batt. Indian Mus., 1892, p. 35 (Hakone; Lake Biwa).-Cynops prechagaster Gray, Cat. Batr. Grad. Brit. Mus., 1850, p. 25 (Japan .- BOUTENGER, Bull. Soc. Zool, France, 1880, p.39.—Huges-DORF, Sitz. Ber, Naturi, Fr. Berlin, 1880, p. 120 (Tokyo; prov. Kazusa; Hakone Mts. Titon pyrchoguster Strauch, Mem. Acad. Sci. St. Pétersb. 7 . NVI. No. 4, 1870, p. 51 Japan: China?).—Iwakawa, Quart. Journ. Microsc. Sci., XXX, 1882, p. --: Zool. Anz., V, 1882, p. 10.—Salamandra pyrchogastra Geerts. Nouv. Arch. Mus. Paris, (2) V, 1881, p. 275 Clapan ... Dien getglas pyrchogaster Cope. Bull. U. S. Nat. Mus., No. 34, 1889, p. 201.

1838. Salamandra subcristata Schlegell. Fauna Jap. Rept., pp. 125-139; Saur. et Batr. pl. tv. figs. 1-3; b pl. v. figs. 7-8 -type-locality. Japan; types in Leiden Mus.; Siebold and Buerger, collectors: Abbild. Amph., 1844, p. 122, pl. xl., figs. 1-3 (color from life).—Cynops subcristatus Tschudi, Classif. Batr., 1838, p. 94, pl. n. figs. a c.—Triton subcristatus Duméril and Bibron, Erpét. Gén., 1X, 1854, p. 140 (Japan).—Hallowell, Proc. Phila. Acad., 1860, p. 494 (in part: "Japan" ...- Martens, Preuss. Exped. Ost-Asien, Zool., I. 1866, pp. 109, 116; 1876, p. 384 (Yokohama).— Fritze, Mitth. Deutsch. Ges. Ost-Asiens, V. 1891, p. 239 (Yezo?).

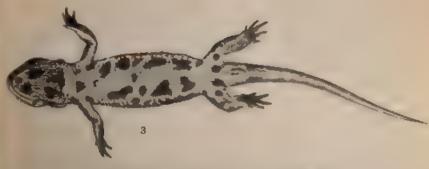
1898. Triton subcristatus var. typica Krefft, Verh. Ges. Deutsch. Naturf. Aerzte, 69 Vers. Braunschw., 1897, 11, Pt. 1, p. 187 (Tokyo: Kyoto).

1898. Triton subcristatus var. immaculi centris Krefft, Verh. Ges. Deutsch. Naturf. Aerzte, 69 Vers. Braunschw., 1897. H. Pt. 1, p. 187 (Kiusiu).

1906. Triton pyrrhogaster subsp. typica Wolterstorff, Abh. Mus. Magdeburg, 1906. p. 162.

Description. Adult male: U.S.N.M. No. 31796; Kyoto, Hondo, Japan: April 20, 1903; Dr. Hugh M. Smith, collector. Vomero-palatine teeth in two closely approximated longitudinal series beginning between the choana and continued posteriorly to beyond a line between the corners of the mouth, in the anterior half nearly parallel, then strongly diverging; tongue small, its width about one-half that of the mouth; nostrils anterior, barely visible from above, their distance from each other considerably less than their distance from the

Fr in πυρούς, tiery red; γαστήρ, belly. b Reproduced in this work, Plate II.



DIEMICTYLUS PYRRHOGASTER FROM SCHLEGEL.

FOR ENPLANATION OF PLATE SEE PAGE 553.

In the meantime the following key must suffice:

KEY TO JAPANESE SPECIES OF DIEMICTYLUS.

DIEMICTYLUS PYRRHOGASTER a (Boie).

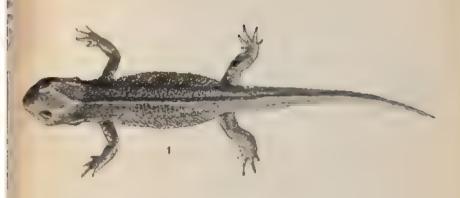
IMORI.

Plate II.

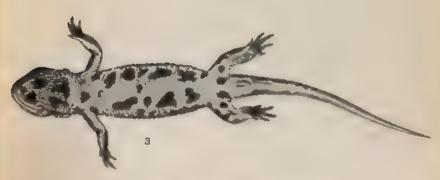
- 18:46 Molge pyrrhogaster Borr, Isis, 1826, p. 215 (type-locality, Japan; Blombol, collector); Bijdr Natuurk, Wetensch., II, Pt. 1, 1827, p. 27. — Molge pyrisgastra Bou LENGER, Cat. Batr. Grad. Brit. Mus., 1882, p.19 (Nagasaki; Kirkning Mis China - Okada, Cat. Vert. Jap., 1891, p. 65 (Tokyo; Kyow, Kaga, Suwo) Borriger, Offenbach, Ver. Naturk. 26-28 Ber., 1888. p. 101, Nat. Batr. Mus. Senekenberg., 1892, p. 56 (Yokohama; Nagaski).-Service, List Batr. Indian Mus., 1892, p. 35 (Hakone; Lake Bivs).-Cynops pyrrhogaster GRAY, Cat. Batr. Grad. Brit. Mus., 1850, p. 5 (Japan) BOLLINGER, Bull. Soc. Zool. France, 1880, p.39.—Hugespour, Sitz. Ber, Naturf, Fr. Berlin, 1880, p. 120 (Tokyo; prov. Karus; Hakone Mts. Fiton pyrchogaster Strauch, Mem. Acad. Sci. St. Petersb. (7), NVI, No. 4, 1870, p. 51 (Japan: China?).—Iwakawa, Quat-Journ Microsc Sci., N.N., 1882, p. - ; Zool, Anz., V, 1882, p. 10,—Selmandra paperbogastra Greners, Nouv. Arch. Mus. Paris, (2) V. 1881, p. 275 Chipano Diennyctylus pyrchogaster Core, Bull. U. S. Nat. Mus., No. 34, 1889 p. 201
- Bate plane, the 1-3, b play, tigs, 7-8 (type-locality, Japan; types in Leiden Mull, Stebold and Buerger, collectors); Abbild, Amph., 1844, p. 122, playe to 1-3 scolor from lifes. Cymops subcristatus Tschudi, Classi, Bate 1838, p. 94, pl. 11, tigs, a c. Triton subcristatus Duméril and Bridge. Cypet Gen., IX, 1854, p. 140 (Japan).—Hallowell, Proc. Phila Acad., 1860 p. 494 in part, "Japan").—Martens, Preuss, Exped. Of Americal Cold. In 1866 pp. 409, 116; 1876, p. 384 (Yokohams).— Incold. Matth. Deutsch. Ges. Ost Asiens, V. 4891, p. 239 (Yezo?).
- 1846 Letton also istat s van Appea Kripper, Verh. Ges. Deutsch. Naturf. Aerste, 69 Ver. Braumechw. 189., 11, Pt. 1, p. 187 (Tokyo; Kyoto).
- Ver to 69 Ver Braunschw (4897, H. Pt. 1, p. 187 (Kiusiu).
- Pan, Ledon par Logarde, whep typica Worrenstorff, Abh. Mus. Magdeburg, pane pater

Description Adult male: U.S.N.M. No. 31796; Kyoto, Hondo, Japan April 20, 1903. Dr. Hugh M. Smith, collector. Vomero-pulating teeth in two closely approximated longitudinal series beginning between the choanse and continued posteriorly to beyond a line between the corners of the mouth, in the anterior half nearly parallel, then trough diverging tongue small, its width about one-half that of the mouth, no trib anterior, barely visible from above, their distance from the

[&]quot;From regime, hery red, racers, belly to Reproduced in this work, Plate II.





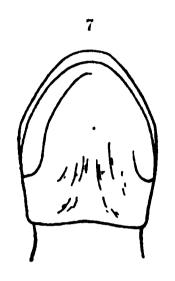


DIEMICTYLUS PYRHOGASTER. FROM SCHLEGEL FOR EXPLANATION OF PLATE SEE PLAGE 553.



eyes and only about two-thirds the width of the interorbital space, which is nearly twice that of the upper eyelid; body moderate, the distance from tip of snout to gular fold (fig. 7) being contained three times in the distance from gular fold to anterior border of vent; legs rather long, tip of longest finger reaching knee and tip of longest toe reaching elbow when the limbs are adpressed to the sides of the body; digits long, depressed, without webs, third finger longest, third and fourth toes nearly equal and longest, first finger and first toe shortest, shorter than fourth finger and fifth toe, respectively; tail strongly compressed (fig. 8), with a fin above and below, the outline of the

fins being straight and nearly parallel, toward the tip tapering to a fine point, which is drawn out as a soft filament nearly 4 mm. long; skin strongly and mostly transverse rugose, except on anterior portion of head, on limbs, and tail; a low, smooth, vertebral ridge from nape to tail, being contiguous with the upper fin of the latter and bifurcating on the occiput; parotoid gland large, prominent, compressed, flap-like, almost continuous with a dorso-lateral glandular ridge cut by transverse grooves into a series of bead-like glands; a similar ventro-lateral ridge from axilla to groin; a large, smooth, globular gland on each side of the neck at each end of the gular fold; a somewhat smaller and flatter but well-defined circular gland above the insertion of the fore leg between the latter and the dorsolateral ridge; vent a longitudinal slit surrounded by a large, globular swelling, the surface of which is coarsely pustular, the pustules near the posterior end of the vent being drawn out into long, pointed, conical papillæ. Color (in alcohol), above, uniform blackish brown; below, including the edge of upper lip, ventro-lateral





FIGS. 7-8.—DIEMICTYLUS. PYRRHOGASTER. 2 × NAT. SIZE; 7, UNDERSIDE OF HEAD; 8, SECTION OF TAIL AT END OF BASAL THIRD. No. 6272, U.S.N.M.

ridge, and the anterior portion of the lower edge of the tail, yellowish white, with a series of irregular blackish blotches on each side of the belly and a few paler ones unsymmetrically on throat and fore neck; underside of hands and feet, dusky.

Dimensions.

	//4 //4 .
Total length	. 93
Tip of snout to gular fold	. 12
Gular fold to anterior angle of vent	. 32
Anterior angle of vent to tip of tail exclusive of filament	. 47
Length of caudal filament	. 4
Width of head	. 10
Fore leg	. 18
Hind leg	. 20
Longest toe	. 7
Height of tail in the middle	. 7

The adult female (U.S.N.M. No. 31894; Kochi, Shikoku; May 11, 1903, Dr. Hugh M. Smith, collector) is larger, total length being 123 mm., and differs from the breeding male in the lesser development of the parotoid glands as well as the lateral glandular ridges, absence of the scapular gland, and the caudal filament. The body is also longer, the distance from tip of snout to gular fold being contained more than three times in the distance from gular fold to vent; so that the fingers and toes barely touch when the limbs are pressed against the side, the toes themselves also being shorter than in the male; finally, the vent is quite different, being a nearly circular opening with long radiating papillæ forming an oval swelling on a compressed elevated base.

The nonbreeding male and female (U.S.N.M. Nos. 30735, 30736; Miyazaki, Kiusiu) differ from the breeding ones chiefly in the lesser development of the glands and of the papillæ surrounding the vent, the male also by the absence of the caudal filamentous appendix.

Color of living specimens.—Dr. Hugh M. Smith has kindly furnished the following note on the color of the living specimens collected by him in Kiusiu and Shikoku during the breeding season. The back is black or blackish green; the underside of head, body, legs, and tail is blood red, with dark green mottling or streaks inclined to be symmetrical. In some specimens the back is lighter green and the sides of the tail may be steel blue.

Variation.—The chief variation is in the amount of dusky or blackish color on the underside. The normal markings seem to consist of a series of irregular spots on each side of the belly sometimes confluent to longitudinal streaks. These markings are often so heavy as to make the sides nearly uniform black, but the center of the belly is usually unspotted. On the other hand, some specimens are nearly devoid of spots. These form Krefft's variety immaculiventris, but they are not confined to any particular locality and represent only the extreme individual variation.

A male specimen taken in May, 1898, near Mount Fuji (U.S.N.M., No. 34308), is of a light grayish brown, almost unspotted underneath and seems to be a sort of albino.

Boulenger and Wolterstorff (Zool. Anz., XXX, 1906, p. 562) express the opinion that a more detailed study of *D. pyrrhogaster* might show the desirability of breaking it up into several subspecies, and the former mentions several breeding males and females from the island of Iki as being very small, as well as some Kobe specimens as having very weak parotoid glands. Whether the former island contains a particular dwarfed race it is impossible to say, as no measurements are given, but I do not believe it will be possible to split the specimens inhabiting the various large islands into geographical forms. The size and prominence of the parotoid glands seem to be more or less dependent on the season.

Habitat. Widely distributed and common, inhabiting streams, ponds, reservoirs, and roadside drains, but probably confined to the lower altitudes.

Siebold^a reported it from Hondo and Shikoku as well as from Kiusiu. Doctor Fritze has stated that he found no specimens in Yezo, but that he saw some in the Sapporo Museum. Doctor Nozawa, however, has emphatically asserted (in letter dated February 27, 1901) that this is a mistake, that "there is no record of its presence [in Yezo] and, moreover, no specimen in the Sapporo Museum."

There are numerous specimens from Nagasaki in the various museums—for instance, in British Museum, the Hamburg Museum, and Museum Senckenbergianum. The United States National Museum has it from Miyazaki, province of Hiuga, Kiusiu, and Dr. Hugh M. Smith reports having observed it in the province of Satsuma.

The latter gentleman collected a fine series at Kochi, province of

Tosa, Shikoku,

From Hondo we have numerous records. Thus, from Tokyo, Kyoto, Kaga, and Suwa (Okada); from Yokohama (von Martens; Mus. Senckenberg), Hakone (Indian Mus.; Hilgendorf), Tokyo, and province of Kazusa (Hilgendorf), Lake Biwa (Indian Museum). Jouy collected it on the way between Yokohama and Kobe, and the Challenger expedition brought home specimens from the latter place. In the Hamburg Museum there are specimens collected by T. Lenz in Kawachi Province, and Prof. R. Hitchcock sent us a specimen from Osaka. Dr. Hugh M. Smith collected three fine specimens in spring ponds near Kyoto and observed the species in the provinces of Ise and Shima, and from Mr. A. Owston we have a large series collected at Mount Fuji. Finally, British Museum has two specimens from "northern parts of Niphon."

There is no record of this species from Tsu-shima, but specimens from Iki-shima, between the latter and Kiusiu are in British Museum.^b

It would be highly interesting to know how far north this species goes in Hondo and also what its distribution is on the west coast. It is also of the greatest importance that its vertical range in the various provinces should be ascertained and recorded.

Diemictylus pyrrhogaster is said to occur in China, but the alleged Chinese specimens of this species are either of very dubious origins

⁴ Introd Rept Fauna Japon , p. xvi

b Boulenger, Zool Anz., XXX, 1906, p. 562.

c Thus the specimen in the museum in St. Petersburg referred to by Strauch (Mém. Acad. Sci. St. Pétersburg, (7) XVI, No. 4, 1870, p. 51) and obtained from Doctor Schaufuss, the Dresden dealer, who was unable, however, to guarantee the correctness of the locality. The habitat "China" is the more suspicious in this case, as the museum in question also has a specimen of Hynobius nations from the same source and same alleged locality. (See Strauch, same reference as above, p. 55.)

or else belong to the Chinese representative, *Diemictylus orientalis* David a recently redescribed by Woltersdorff.

Another nearly related species, *Diemictylus sinensis* (Gray) is also a native of China, the type having been collected "inland of Ningpo."

Boettger mentions four specimens from Hongkong in Museum Senckenbergianum. For difference from *D. pyrrhogaster* consult Boettger, Offenbach. Ver. Naturk. 26–28 Ber., 1888, p. 100.

Lately a third species has been discovered at Yunnan fu, province of Yunnan, at an elevation of about 6,000 feet, namely, *Molge wolterstorffi* Boulenger.^b

List of specimens of Diemictylus pyrrhogaster.

U.S.N.M. No.	Sex.	Locality.	When collected.	By whom collected or from whom received.	Total length.
	•				mm.
6272a	Male	Japan	• • • • • • • • • • • • • • • • • • • •	•••••	80
6272b		do			
6272c	1	do			87
6272d		do			83. 8
6272 <i>e</i>		do			98
14865		Osaka			1
17811	l .	Kobe to Yokohama	_ ,	•	•
17812	1	do			111
30735		Miyazaki, Kiusiu			77.
30736	1	do			92.
30737		do			
3073 8	!	do			81
31794	do	Kyoto, Hondo	Apr. 20, 1903	II. M. Smith	98
31795		do			-
31796	do c .	do	do	do	93
31894	Female b	Kochi, Shikoku	May 11, 1903	do	123
31897	do	,do	do	do	113
31898	do	do	do	do	104
31899	do	do	do	do	109
31900	Male	do	do	do	83.
31901	do	do	do	do	89
34288	Female	Mount Fuji, Hondo	May, —, 1898	A. Owston	119. 8
34289		do			
34290	do	do	do	do	116
34291	Male	do	do	do	104
34292	do	do	do	do	100
34293	Female	do	do	do	118.
34294	do	do	do	do	122
34295	Male	do	do	do	100
34296	1	do			1
34297	l .	do			1
	a Figs. 7-8.	^b Description, p. 18		c Description, p. 16	. •

a Triton orientalis David, Jour. Trois. Voy. Emp. Chinois, I, 1875, p. 32 (type-locality, Kioutchéou, Prov. Che-kiang, China); II, pp. 215, 238 (Tsitou, Prov. Kiangsi) (types in Paris Mus.).—Triton pyrrhogaster subsp. orientalis Wolterstorff, Zool. Anz., XXX, Aug. 28, 1906, p. 558; Abh. Mus. Magdenburg, 1906, p. 153, pl. 1, figs. 3-6 (Chee-chou, Prov. Hupeh).

b Proc. Zool. Soc. London, 1905, I, p. 177, pl. xvn.

List of specimens of Diemict	ylus pyrrhogaster—Continued.

U.S.N.M. No.	Sex.	Locality.	When col- lected.	By whom collected or from whom rece ved.	Total length.
					mm.
34298	Female	Mount Fuji, Hondo	May, 1898	A. Owston	103
34299		do			100
34300	Male	do	do	do	95. 8
34301	do	do	do	do	93.
34302	Male	Mount Fuji, Hondo	May —, 1898	A. Owston	93
34303	do	do	do	do	95.
34304	do	do	do	do	97
34305	Female	do	do	do	118
34306	Male	do	do	do	94
34307	do	do	do	do	92
34308	do a	do	do	do	110
		•			1

a Albino?

DIEMICTYLUS ENSICAUDAa (Hallowell).

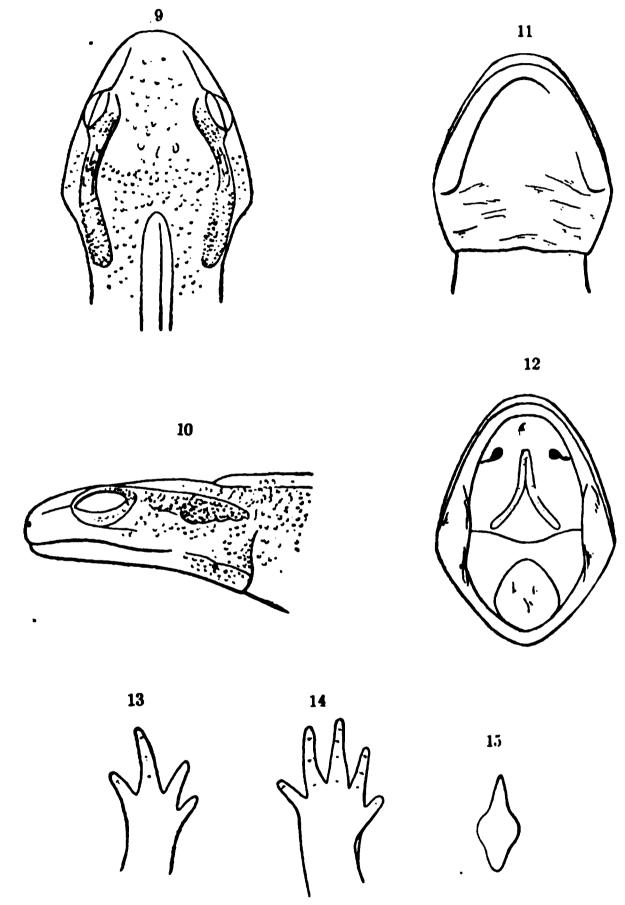
- 1860. Triton subcristatus Hallowell, Proc. Phila. Acad., 1860, p. 494 (in part; not of Schlegel).
- 1860. Triton ensicauda Hallowell, Proc. Phila. Acad., 1860, p. 494 (type-localities: Amakarima I. and "Ralousima . . . the northern half of Ousima proper;" types nos. 7410 and 7456, U.S.N.M.; Stimpson, collector).
- 1887. Molge pyrrhogaster var. ensicauda Boulenger, Proc. Zool. Soc. London, 1887, p. 150 (Riu Kiu).—Boettger, Offenbach. Ver. Naturk. 33-36 Ber., 1895, p. 106 (Okinawa).
- 1891. Molge pyrrhogastra var. ensicaudatus Okada, Cat. Vert. Japan, p. 65 (Okinawa shima).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 865; author's separate, p. 16 (Okinawa).
- 1902. Molge pyrrhogastra ensicauda Brown, Proc. Phila. Acad., 1902, June 11, p. 186 ("Loo Choo Islands," probably Okinawa shima; Furniss and Hiller coll.).

Description.—Adult male; U.S.N.M. No. 7410a; cotype; O-shima, Riu Kiu Archipelago; William Stimpson, collector (figs. 9-15). Very similar to the male of D. pyrrhogaster, but proportions different, the head being larger, toes shorter, and tail longer; distance from tip of snout to gular fold contained less than three times in distance from gular fold to vent; fingers and toes interdigitate when limbs are pressed against the side; glands and glandular ridges much less developed. Color (in alcohol) underneath uniform yellowish; underside of digits also yellowish.

Dimensions.

,	mm.
Total length	. 111
Tip of snout to gular fold	
Gular fold to anterior angle of vent	
Anterior angle of vent to tip of tail	. 59
Width of head	. 12
Fore leg	. 20
Hind leg	. 20
Longest toe	. 4
Height of tail in the middle	. 6

This specimen is apparently not taken in the breeding season. Another adult male (U.S.N.M. No. 36554) appears to be in the breeding stage, however, as there is a distinct indication of a terminal caudal appendix and the globular swelling around the vent is very great with highly developed papillæ. Notwithstanding these signs the glands and glandular ridges are very poorly developed; the parotoids are



FIGS. 9-15.—DIEMICTYLUS ENSICAUDA. 2 × NAT. SIZE. 9, TOP OF HEAD; 10, SIDE OF HEAD; 11. UNDER-SIDE OF HEAD; 12, OPEN MOUTH; 13, HAND; 14, FOOT; 15, SECTION OF TAIL AT END OF BASAL THIRD. No. 7410-a, U.S.N.M.

small, the gular spherical gland, the scapular circular gland, and the ventro-lateral ridge are not indicated.

The females appear to differ from the males much as do the D. pyrrhogaster females.

Color of living specimens.—It is stated that this species is yellow or

orange underneath and not blood-red, as D. pyrrhogaster. (See Stimpson's notes as given in the footnote.")

Variation. Our O-shima specimens seem to be browner, though this may be due to fading, and are unspotted underneath. On the other hand, the Okinawa specimens are blotched with blackish after the fashion of D. pyrrhogaster. Whether there is any constant difference in the coloration of the specimens from the two islands can not be decided from the specimens at hand, nor whether any structural difference exists between them. Large series of fresh material representing both species in the corresponding stages would be required for the purpose.

Habitat This salamander was first collected during Commodore Perry's expedition in May, 1853, by Mr. W. Heine, in the Loo Choo Islands, but it was first recorded from specimens brought home by the Rodgers North Pacific Surveying and Exploring Expedition. According to Hallowell's account of the herpetology of this expedition, specimens were collected by Messrs. Squires and Macomb in April, 1855, on Amakarına Isle (Kerama shima), while others were from the northern half of Oushima—i—e., Amami-o-shima. The latter were collected by W. Stimpson, but, as shown below, they probably came from Kakeroma shima. Since then various collectors have obtained it in the Riu Kius. Thus the U.S. National Museum has received two specimens (48a) from the Science College Museum, and there are three in the British Museum—one from one of Pryer's collectors, the two others from Holst. It has not been recorded

a Hallowell's statements and Stimpsen's manuscript notes are at variance, and it is impossible new to striighten out the taugle. Only one set of specimens brought home by the expedition has been preserved, viz, three specimens numbered 7410 U.S.N.M., which are uniform undermeath without black blotches.

These, according to Hallowell [p. 494], should be the No. 53 of the congrual catalogue and come from [Ralousima]" the northern half of Cusima proper." Besides these homentions "specimens marked No. 5, found in the paddy fields at the Amakarium Isle Loo Choo, April, 1855, by Mr. Squares and Mr. Macomb."

Now, turning to Doctor Stumpson's manuscript catalogue we find the following entries:

"Ou 53, Salamander' found in middly poud holes among the mountains, and in damp places in thickets [Ousima scratched out by W. S.] April [and substituted) Katonasima I, (the S. half of Ousima, (Wright, [here follows a sketch of the two islands—the northern inscribed Ousima, the southern Katonasima]. Above black, below deep vermition with black spots and patches.

"Ana.-5. Safanander" found in the paddy fields at the Amakirruna Islese Loo Choor

April, 1855 (Mr. Squires and Mr. Macomb)

In the first place, I can find on no map and in no gazetteer such a name as "Ralousima," and one wonders it Hallowell's manuscript can have had "real Ousima". In the second place, Stimpson's Katonasima," is plainly Kakeroma shima. It then seems probable that Hallowell got mixed up and wrote northern, where he should have written southern.

from the Yaeyama group, and consequently appears to be confined to the central group of the Riu Kius.

S. N. M. No.	Sex.	Locality.	When collected.	By whom collected	Total length.
					mm.
7410a	Male a	O-shima group Riu Kiu		W. Stimpson	111
7410b	do a	do		do	106
7410c	Female a	do	1	do	¦ • • • • • • • • •
7451a	Male	[Okinawa] Riu Kiu	1	W. Heine	105
7 4 51 <i>b</i>	Female	do		do	112
36554	Male b	Okinawa shima		Sci. Coll. Tokyo	104
36555	do	do	1	do	110

List of specimens of Diemictylus ensicauda.

Family AMBYSTOMIDÆ.

Two subfamilies based upon cranial and hyoid characters may be recognized, the Hynobiinæ, which are peculiar to the eastern part of the Old World, and the Ambystominæ, which are almost entirely confined to the New World.

A word may here be said as to the name Ambystomidæ for this family. It is derived from the generic name Ambystoma, given by

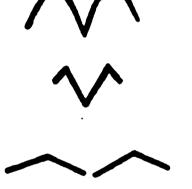


FIG. 16.—DIAGRAM OF ARRANGEMENT OF VOMERINE TEETH IN ONYCHODACTYLUS, SALAMANDRELLA, AND GEOMOLGE. (FROM NIKOLSKI, ANN. MUS. ZOOL. ACAD. SCI. ST. PÉTERSBOURG, I, 1896, p. 78.)

Tschudi in 1838, generally emended to Amblystoma under the erroneous impression that the original spelling was due to a misprint, and that Tschudi intended to derive it from $\alpha\mu\beta\lambda\nu_s$, blunt. This emendation is utterly unwarranted for not only does Tschudi use the word Ambystoma four times, but it is plainly a legitimate contraction for Anabystoma, with allusion to the phrase $\alpha\nu\alpha$ $\sigma\tau\dot{o}\mu\alpha$ $\beta\nu\epsilon\nu$, to cram into the mouth. The shorter form of Ambystomidæ for Ambystomatidæ is justified by the perfectly correct practice in Greek to form composite words with nouns ending in $-\mu\alpha$ (genitive, $-\mu\alpha\tau os$) by leaving out the τ of the root (Kretschmer, Sprachregeln, 1899, p. 19, § 15), for instance, $\sigma\tau\dot{o}\mu\alpha\rho\gamma os$.

KEY TO THE GENERA INHABITING JAPAN AND EASTERN SIBERIA (fig. 16).

- a. Median angle of vomero-palatine series of teeth extending farther back than the lateral ends.
- a². Vomero-palatine series not extending farther back in the middle than on the sides.

a Cotypes; description, p. 21, and figures, p. 22.

b Description, p. 21.

- b^2 . Vomero-palatine series interrupted in the middle; no claws......Geomolge, p. 47.

Genus HYNOBIUS a Tschudi.

- 1838. Pseudosalamandra Tschudi, Classif. Batr., pp. 56, 91 (type, H. nævius).
- 1838. Hynobius Techudi, Classif. Batr., pp. 60, 94 (type, H. nebulosus).
- 1839. Molge Bonaparte, Icon. Fauna Ital., II, fasc. xxvi, fol. 131** (type, M. nævia) (not of Merrem).
- 1848. Hydroscopes Gistel, Naturg. Thierr., p. xi (substitute for Pseudosala-mandra).
- 1854. Ellipsoglossa Duméril and Bibron, Erpét. Gén., IX, p. 97 (same type).

As will be seen from the above synonymy, *Pseudosalamandra* of Tschudi has a few pages precedence of his *Hynobius*. As E. D. Cope, the first author to formally combine the two genera under one of Tschudi's names, selected *Hynobius* for the greater group, the name so selected by him must stand, according to International Code of Zoological Nomenclature, art. 28.

The genus *Hynobius*, although far from peculiar to Japan, is nevertheless quite characteristic. Of the seven known species, four have not been found outside of the islands of Hondo, Shikoku, Kiusiu, and Tsu-shima; one has been found in Korea; and one is of uncertain locality, it being doubtful whether the only specimen known came from Japan or China. Thus far only one species is known with certainty from the latter country, namely, *H. chinensis* Guenther.^b

KEY TO THE JAPANESE AND KOREAN SPECIES OF HYNOBIUS.

- a^1 Tail subcylindrical for more than the basal half, more or less compressed toward the tip, not keeled.
 - b^1 Fifth toe well developed.
- - b^2 Eleven costal grooves.
 - c^1 Fifth toe well developed; vomero-palatines with the median angle extending backward a considerable distance beyond the lateral arms.
 - H. nigrescens, p. 34.

i

[&]quot; From ὑνις, a ploughshare; βίος, life.

b Ann. Mag. Nat. Hist. (6), IV, 1889; p. 222, from Ichang.

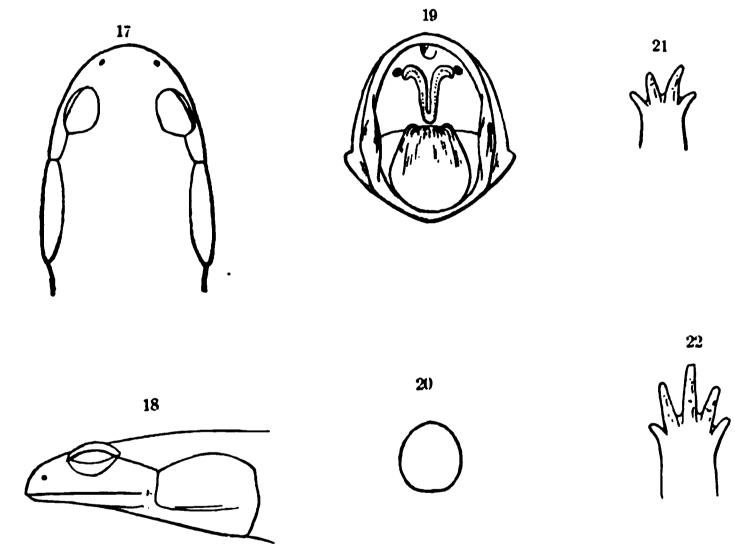
HYNOBIUS NÆVIUS a (Schlegel).

Plate III, figs. 1-3.

1838.—Salamandra nævia Schlegel, Fauna Jap., Rept., pp. 122, 129, Saur. et Batr., pl. iv, figs. 4-6;b pl. v, figs. 9-10 (type-locality, Hondo and Shikoku; types in Rijksmuseum, Leiden; Siebold, collector); Abbild. Amphib., 1844, p. 122, pl. xxxix, fig. 4 (color from life).—Geerts, Nouv. Arch. Mus. Paris, (2)V, 1883, p. 275.—Ellipsoglossa nævia Duméril and Bibron, Erpét. Gén., IX, 1854, p. 99, pl. ci, fig. 5 (Japan, Siebold coll.).—Strauch, Mém. Acad. Sci. St. Pétersb. (7), XVI, 1870, p. 55 (Japan; China?).—Fritze, Mitth. Deutsch. Ges. Ost-Asiens, V, 1891, p. 239 (absent in Yezo).—Hynobius nævius Cope, Proc. Phila. Acad., 1859, p. 125.—Martens, Preuss. Exped. Ost-Asien, Zool., I, 1876, p. 384 (Nagasaki).—Okada, Cat. Vert. Jap., 1891, p. 65 (Kyoto).

1850.—Molge striata Gray, Cat. Batr. Grad. Brit. Mus., p. 31 (not of Merrem 1820).

Description (figs. 17-22).—Adult female; U.S.N.M. No. 23901; Kumamoto, province Higo, Kiusiu; Nakagawa, collector. Vomero-



Figs. 17-22.—Hynobius nævius. $2 \times$ nat. size. 17, top of head; 18, side of head; 19, open mouth; 20, section of tail at end of basal third (1\frac{1}{2}\) nat. size); 21, hand; 22, foot. Sci. Coll., Tokyo.

palatine series long, forming a very acute angle posteriorly, length of inner principal branch about equaling three-fourths the width of the tongue, the outer, short, recurring branch forming an acute angle; head rounded anteriorly, flat, somewhat concave behind the eyes; nostrils situated halfway between eye and tip of snout, their distance from each other equaling the interorbital space; eyes large, prominent, their longest diameter nearly equaling the interorbital space, which is

a Latin, signifying spotted.

b Reproduced in this work on Plate III, figs. 1-3.





FIGS. 1-3, HYNOBIUS NÆVIUS, FIGS. 4-6, H. NEBULOSUS. (FROM SCHLEGEL.)



171 171

less than twice the width of the upper eyelid; distance from tip of snout to gular fold contained three times in distance from gular fold to anterior border of vent; limbs rather short, fingers and toes when laid against the body not meeting by about two costal folds; fingers and toes moderate, somewhat depressed, without webs; fifth toe well developed, about size of third finger, but slightly shorter than first toe; tail very short, its length from anterior end of vent only one-half the distance from the same point to tip of snout, subcylindrical, becoming compressed only a short distance from the tip, no keel above or below; skin everywhere smooth and glossy with numerous minute pits all over; fourteen distinct costal grooves including the axillar and inguinal ones; a median dorsal groove; parotoid gland flat, large, distinct, with a sharp, rounded upper edge; a distinct groove from eye to parotoid; gular fold strong; vent (female) a single longiturdinal slit, borders not swollen. Color (in alcohol) pale cinnamonrufous above, on sides and underneath gradually fading to pale pinkish buff, everywhere densely marbled and clouded with dusky, the markings being larger and coarse on the upper surface.

Dimensions.

	7/6//6.
Total length	86
Tip of snout to anterior border of vent	57
Anterior border of vent to tip of tail	29
Tip of snout to gular fold	14
Width of head	10
Long diameter of eye	3
Fore leg	12
Hind leg	15
Width of tail at middle	5
Height of tail at middle	6

The male is said to have the vent consisting of a longitudinal slit "with a small papilla and a short transverse slit anteriorly."

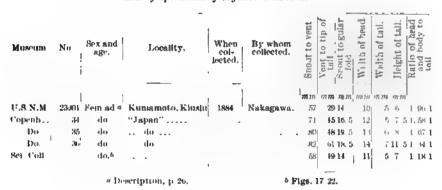
Variation.—The length of the tail in the specimens measured by me varies to such an extent that I am not quite sure we here have to deal with only one species. The coloration also is very different in different specimens, and gives rise to similar doubts. But, unfortunately, the variation in the ratio between the length of the tail and that of the head and body is so gradual, as shown in the table below, that I do not see my way clear to draw a line, while on the other hand the two specimens with the greatest difference in tail proportion agree in color and differ from the specimens with intermediate proportions. The relative width and height of the tail is similarly varied, and is equally unsuited to furnish a demarcation line. One of the specimens, the one in the Science College, Tokyo, collection, has thirteen costal grooves, the others have fourteen.

The difference in the coloration is considerable. The Science College specimen is paler (more faded?) with less coarse marblings than the one described above, and the underside nearly uniform pale The three specimens in the Copenhagen Museum, however, are uniformly brown above, with large pale spots and coarse marblings on sides only. These specimens were probably received from the Leiden Museum, and thus verify Schlegel's remarks in the original description as follows: The system of coloration in this species seems to us to be rather constant in the large number of speci-This salamander is of a slatv mens which we have examined. or plumbeous color, uniform above, but varied with large whitish spots confluent like marblings on the flanks and on the lower parts. which often are paler or tending to yellowish. Finally, the colored figure reproduced in Schlegel's "Abbildungen," pl. xxxix, fig. 4. from a sketch from a living specimen, is black above with very distinct irregular whitish blotches on sides of head, body, and tail, and upper side of limbs. Boulenger's description of specimens in British Museum having the same origin as the above is similar, "blackish gray, lighter beneath; sides variegated with light gray."

In view of this uniformity it is difficult to understand the variation in the two specimens before me, and, I may add, in a third one in Science College from the same locality as ours described above.

Habitat.—Judging from Siebold's preface to the reptile volume of Fauna Japonica (p. xvi) he obtained the present species only in Hondo and Shikoku, but not in Kiusiu. It should be noted, however, that von Martens (l. c.) records it as obtained at Nagasaki by Doctor Pompe, and that the specimen in our museum (No. 23901) is from Kumamoto, province Higo, Kiusiu. These are the only definite records of locality which I have been able to find except Kyoto, as given by Okada. It seems certain, however, that it is absent in Yezo.

List of specimens of Hunobius nævius.



HYNOBIUS LEECHII4 Boulenger.

Plate IV fig 8

1887 Hynobius leechii Boulenger, Ann Mag Nat Hist (5), XIX, p 67 typelicality, Gensan, Korea type in Brit Mus., Leech, collector), Proc. Zoel, Soc. London, 1890, p 326

Hynobius leechii is undoubtedly closely allied to H. nævius. Boulenger hints at a difference in the proportion between head and body which I have been unable to appreciate while examining the type with the kind permission of the authorities of the British Museum.

The chief difference is perhaps in the shorter vomero-palatine series. It should be noted, however, that one of the British Museum specimens of *II. nævius* approaches the *II. leechii* very closely in this respect. Boulenger's original description is herewith appended

Original description of type specimen.— British Museum No. 86, 12, 8, 14; Gensan, Korea; J. H. Leech, collector. Palatine teeth forming a V-shaped figure, which is broader than long; the length of one of the series, from anterior to posterior angle, equals one-half of the width of the tongue; head depressed, a little longer than broad; snout short, rounded, body thrice and two-thirds the length of the head; the distance from snout to gular fold contained nearly thrice in the distance from latter to cloaca; limbs not meeting when adpressed; fifth toe well developed; tail nearly as long as the distance between gular fold and vent, thick, compressed, not heeled, with vertical grooves, obtusely pointed posteriorly; skin smooth; thirteen costal grooves; a vertebral groove. Blackish brown, above speckled with pale brownish; upper surface of tail pale brownish, with a few black dots.

Dimensions	
	n m
Total length	83
From shout to closes	47
Head .	. 10
Width of head	8.5
Fore limb	12
Hend limb	14
Tail	36. 6

Habitat. A single specimen only has thus far been obtained. It formed part of a collection made by Mr. J. H. Lecch at Gensan, Korea, and by him presented to British Museum in 1886.

^{*} For J. H. Leech, esq., who collected the type,

^{*}Boulenger Ann Mag N H (5 , XIX 1887, p 67

[&]quot;While there is nothing intrinsically improbable in this species being Korean, it may be well cuntil the find is cerre borated) to refer to what is said about a specimen of Elaphe conditivinguia alleged to have been collected by Mr. Leech at Gensan (see p. 331).

List of specimens of Hynobius leechii.

Brit. Mus. No.	Sex and age.	Locality.	When collected.	By whom collected.
86. 12. 8. 14 <i>a</i>		Gensan, Korea		J. H. Leech.

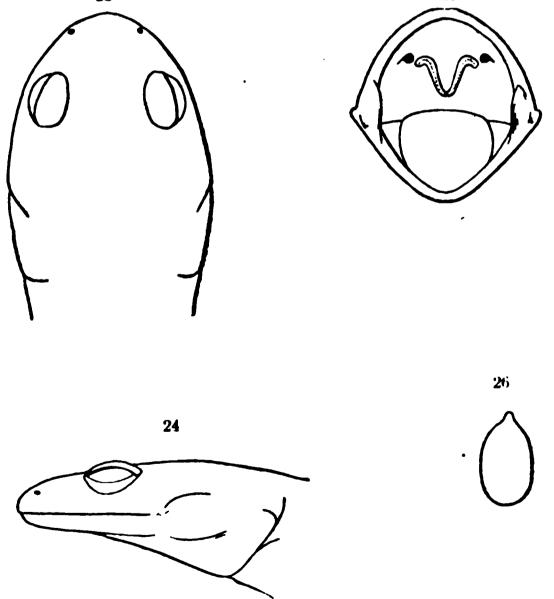
a Type.

HYNOBIUS NEBULOSUS (Schlegel).

Plate III, figs. 4-6.

1838. Salamandra nebulosa Schlegel, Fauna Jap., Rept., pp. 127, 139, Saur. et Batr., pl. IV, figs. 7-9 b (type-locality, "Mits jama" near Nagasaki, Kiusiu; types in Rijksmuseum, Leiden; Siebold, collector); Abbild. Amphib., 1844, p. 126, pl. xl, figs. 7-10 (color from life).—Geertse Nouv. Arch. Mus. Paris (2), V, 1883, p. 275.—Hynobius nebulosus Tschudi, Classif. Batr., 1838, pp. 60, 94.—Gray, Cat. Batr. Grad. Brit. Mus., 1850, p. 30 (Japan).—Boulenger, Cat. Batr. Grad. Brit. Mus., 1882, p. 32 (Nikko).—Okada, Cat. Vert. Japan, 1891, p. 65 (Nikko).—Sclater, Batr. Ind. Mus., 1892, p. 36 (Yezo(?)).—Boettger, Kat. Batr. Mus. Senckenberg., 1892, p. 52 (Nagasaki).—Ellipsoglossa nævia Duméril and Bibron, Erpét. Gén., IX, 1854, p. 100 (Japan).—Strauch, Mém. Acad. Sci. St. Pétersbourg (7), XVI, 1870, p. 55 (Japan).—Fritze, Mitth. Deutsch. Ges. Ost-Asiens, V, 1891, p. 239 (absent in Yezo).

Description.—Adult male; Science College Museum, Tokyo, No. 51; Nikko (figs. 23-26). Vomero-palatine series of teeth long, forming



Figs. 23-26.—Hynobius nebulosus. 2 × nat. size. 23, top of head; 24, side of head; 25, open mouth; 26, section of tail at end of hasal third. No. 51, Sci. Coll. Tokyo.

an acute angle posteriorly, length of inner principal branch equaling one-half the width of the tongue, the outer, short, recurving branch forming an arch with the inner one; head flat, broad; nostrils situated much nearer the tip of snout than the eyes, their distance from each other equaling the interorbital space; eyes moderate, their long diameter about equaling twothirds the width of the interorbital space, which is at least twice the width of the upper

eyelid; distance from tip of snout to gular fold contained three and one-fourth times in distance from gular fold to anterior border of vent;

Latin, signifying clouded. Be Reproduced in this work on Plate III, figs. 4-6.

limbs moderate, fingers and toes when laid against the body overlapping; fingers and toes rather long, depressed, without webs; fifth toe well developed, nearly equaling first toe, though not as long as third finger; tail long, equaling the length of head and body, compressed from the base, tapering, pointed at end, with a dorsal fin beginning at the basal first third and a lower ventral fin in the terminal fourth; 13 distinct costal grooves including the axillar and inguinal ones; a median dorsal groove; parotoid gland indistinct; postocular groove indistinct; gular fold well marked, vent (male) a longitudinal slit bifurcating anteriorly, with a papilla in the fork, borders swollen. Color (in alcohol) above dull isabella-color, the upper surface with indistinct paler marblings; underneath pale drabgray; the entire surface above and below dusted over with minute dusky specks visible under the magnifying glass.

Dimensions	
	2/7 771
Total length	135
Tip of shout to anterior border of vent	68
Anterior border of vent to tip of tail	67
Tip of shout to gular fold	16
Width of head	12
Long diameter of eye	3
Fore leg	22
Hand leg	20
Width of tail one head-length from vent	4
Height of tail one head-length from vent	6

Variation. An adult specimen in British Museum (No. 92, 1, 11, 18) collected by Holst in Tsu-shima, October 6, 1891, has a somewhat longer series of vomero-palatines, inasmuch as the length from angle to angle is about two-thirds the width of the tongue. The proportions of head and body are nearly the same—viz, shout to gular fold 16 mm, and gular fold to vent 52 mm, or the latter distance three and one-fourth times the former. The tail, however, is much shorter, being less than the body without head. The color (in alcohol) is also different, being above yellowish brown with numerous obscure dusky spots; underneath uniform pale brownish, this pale effect being produced by a uniform dusting of minute, round, vellowish specks on a dark brownish gray ground. The coloration of this species is usually described as more strongly murbled and variegated than the above individuals, in fact much more like the two specimens described above as H. nævins. It should be noted, however, that the colored reproduction of the drawing from a living specimen in Schlegel's 'Abbildungen," pl xL, figs. 7 and 8, shows an animal uniformly dark brown above, more grayish and paler underneath.

Remarks. This species differs chiefly from H. navius in the short body with longer limbs, so that the fingers and toes overlap on t side, and in the more pointed tail, which is compressed all the wa from the base and keeled and finned above and below toward the tip.

Absent less 2.—A single specimen. No. 33 in the Zoological Museum in Conenhagen, which I had the opportunity to examine in 1905 owing to the kindness of Inspector Jensen, was received in 1847, probably from Schlegel in Leiden, and is labeled "Japan." It is in every respect a typical H. rebulosus, except that it has only 4 well-developed toes, the rudiment of the fifth toe being scarcely noticeable. It consequently holds the same relation to H. rebulosus, as H. peropus to H. reschool in fact, the rudiment of the fifth toe is even smaller than in Boulenger's figure of H. peropusal. It has the vomero-palatine series very long and 13 costal grooves.

The lack of the toe being the only character, I do not regard this specimen as representing a distinct form or species.

Habitat.—This species was originally described from specimens collected by von Siebold at Mits yama, near Nagasaki. A specimen from the latter place is also in the Senckenberg Museum. Siebold also indicates its occurrence in Hondo and Shikoku, though somewhat indirectly. A young specimen collected by C. Maries at Nikko, Hondo, is in British Museum, and Nikko specimens are also in the Science College Museum in Tokyo No. 51.

Sclater records three specimens in the Indian Museum as collected by Dr. J. Anderson in Yezo, but this is probably an error for Yedo, as there is no corroboration of its occurrence in the northern island.

British Museum has specimens No. 92, 1, 11, 18; female and larvae collected by Holst in Tsu-shima, the female on October 6, 1891, the larvae on August 7.

M 1136-111: .	<u></u>	- 	Lowality	Where e	Briwhor, collected.	Total length.	Snoul to vent.	Vent to tip of tail.	Snout to gular fold.	Width of head.
						$u_i v_i$	n, m	•1	mm	mm
Ref. Coll. Tokyo	7.1	Market	Nickley			1.35	1.8	. 7	1.4	12
Coperdiagen	.14	10000	t Tapan .			19.5	74	\$1	12	9
Brit. Mus .	. 92.1 31.48	Francis S.	To testime.	061,603	P. Helster	:::7	• •	1.1	141	••••
_ d	e ript ien, p	a), 5g+ 20	 - *			- >-	— • p. 3	 i.		

HYNOBIUS PEROPUS " Boulenger.

Plate IV. 1.24, 4-7.

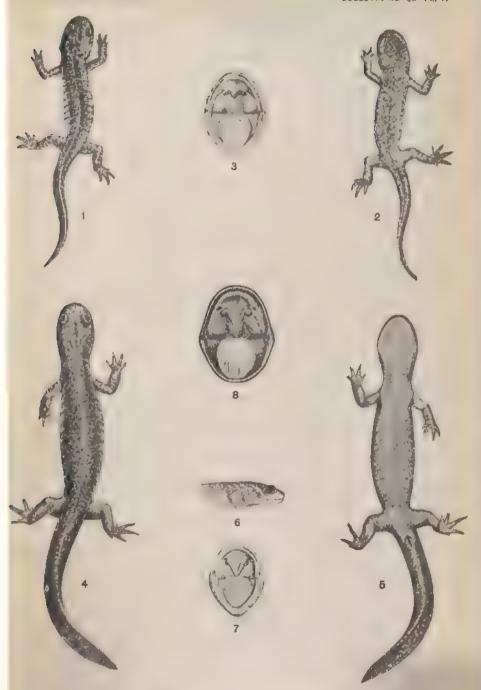
1882. Hynobius peropos Bottlesora, Cat. Batr. Grad. Brit. Mus., p. 33, pl. 11, figs. 1-1ad (type-locality uncertain, China or Japan; type in Brit. Mus.; A. Adams, collector.

a Reproduced on Plate IV stgs. 1.5 of this work.

[▶] Introd. Rept. Fauna Japon., p. XVI.

From appos, mutilated; and s. lost.

[&]amp; Reproduced in this work on Plate IV. 192-, 1-7.



Figs. 1-3, Hynobius Lichenatus, Figs. 4-7, H. Peropus, Fig. 8, H. LEECH FROM BOULENGER.

FOR EXPLANATION OF PLATE SEE PAGE 553.



The exact locality of the type-specimen is unknown, but a specimen in the Hamburg Museum. No. 1020, collected by T. Lenz in 1896 in Yamato, shows that the species is Japanese. Thanks to the kindness of the authorities of the British Museum. I have had the opportunity to examine the type. As stated by Boulenger, the fifth toe is quite radimentary, even more so than in H. lichenatus. It has nothing to do with the latter species, however, as it has thirteen costal grooves, longer series of vomerine teeth, and a cylindric tail. This latter character places it near to H. ravius. The chief difference from the latter in the shape of the tail consists in its being slightly longer, and the terminal portion more compressed and pointed. The vomerine dental series is also shorter, and in H. ravius the fifth toe is well developed.

Having nothing further to add to Boulenger's original description, it is here reproduced.

Original description of type speciment. Adult male: British Museum: China or Japan: A. Adams, collector. The length of the palatine series, from anterior border to posterior angle, equals half the width of tongue: head depressed, longer than broad; shout short, rounded; eyes rather large, prominent; no labial lobes; body cylindrical, slightly depressed, nearly four times the length of the head; the distance from shout to gular fold three times in the distance from latter to cloaca: limbs moderate, not meeting when adpressed: fingers and toes more clongate than in the preceding species; fifth toe rudimentary, tubercle-like; carpal and tar-al tubercles indistinct; tail shorter than head and body, strongly compressed and keeled in its posterior half, ending in a point; vent of male three slits meeting in front, the median longitudinal and longest, the two others obliquely directed forward, forming an angle; the borders not swollen: skin smooth; thirteen costal grooves; a median dorsal groove; parotoids indistinct; gular fold distinct; no fold from eye to gular fold. Reddish brown above, speckled and minutely marbled with dark brown; tail dark brown, with lichen-like gray variegation; yellowish brown beneath: beliy speckled with lighter.

	7,			
The state of				7602. 109
Total length	•	•	•	 _
From snout to chaca				59
H-ad				12
Wight of load				59
Fore- limite				15
Himil limite				17
Tatl				Ty() +1

Habitat. -- As already stated, the exact locality where Mr. Adams collected the unique specimen which Botto the described and figured

a Boulenger, Car. Her. Co. a. D. M. H. St. 1994

is not known, and as he collected both in China and Japan it may have come from either of these countries. The probability is, however, that it really came from Japan, since a specimen in the Hamburg Museum was collected in the province of Yamato, Hondo.

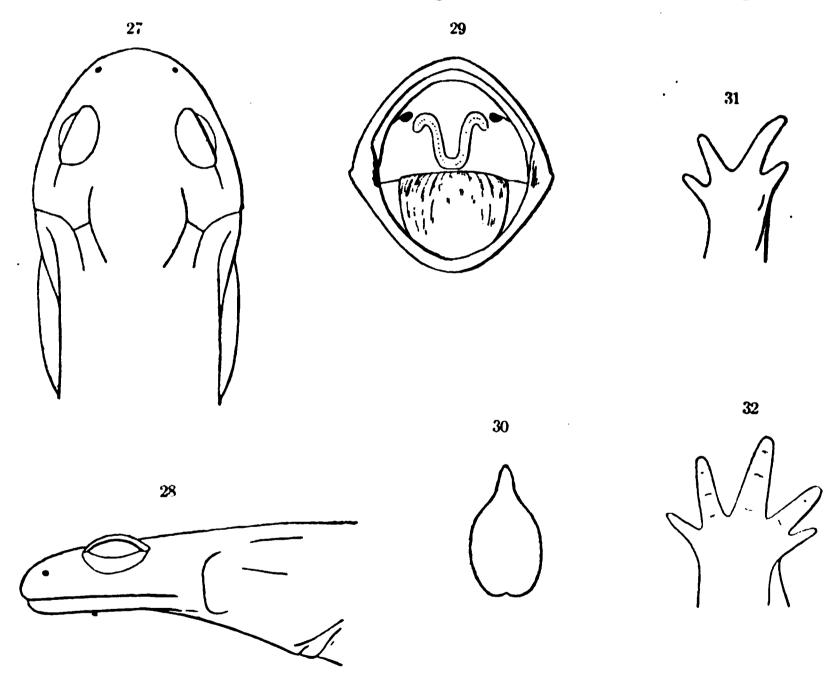
List of specimens of Hynobius peropus.

Museum.	No.	Sex.	Locality.	When collected.	By whom collected.
Brit. Mus	(a)	Malea	"China or Japan"		A. Adams.

a Type; description, p. 33; plate 1V, figs. 4-7.

HYNOBIUS NIGRESCENS, a new species.

Diagnosis.—Series of palatine teeth typical, the length equaling four-sevenths the width of the tongue; fifth toe well developed; tail



Figs. 27-32. Hynobius nigrescens. $2 \times$ nat. size. 27, top of head; 28, side of head; 29, open mouth; 30, section of tail at end of basal third; 31, hand; 32, foot. No. 57a. Sci. Coll. Tokyo.

long, strongly compressed, keeled above and below; eleven costal grooves.

Habitat.—Sendai, Hondo, Japan.

Type.—Science College Museum, Tokyo, No. 57A.

Description of type-specimen.—Adult male (figs. 27-32). Shape of palatine series of teeth typical, though more U-shaped than V-shaped,

a Latin, signifying blackish.

the posterior branches but slightly converging, the posterior end of each making a sudden bend to meet its fellow on the other side; the extreme length of the series equals four-sevenths the width of the tongue; head large, depressed, as broad as long; eyes rather large, prominent; body medium, distance from snout to gular fold contained less than three times in distance from gular fold to anterior end of vent; limbs well developed, fingers and toes interlocking when laid against the body; fingers and toes moderate, depressed, fifth toe well developed; tail long, the distance from tip to anterior end of vent exceeding that from the latter point to end of snout, strongly compressed, pointed, keeled above and below, the upper keel originating almost opposite the posterior end of the vent; skin smooth, except on the tail, where it is rather strongly rugose; sides with eleven very distinct costal grooves; a medium dorsal groove; parotoids indistinct; gular fold strongly marked underneath, but not on the sides; no groove from eve to gular fold; no groove behind angle of the jaws; vent (of male) a longitudinal slit meeting two short, lateral, converging slits anteriorly; a large papilla at the anterior end; a distinct transverse groove at the posterior end; borders greatly swollen. Color uniform blackish above, the whole surface finely dusted over with minute pale specks, below considerably paler, the specks predominating over the black ground, tail uniformly dark, including the keels.

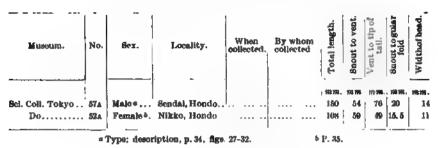
	Dimensi	0718		
				mm.
Total length			 	150
From snout to gular fold			 	 20
From gular fold to vent				54
Vent to tip of tail				76
Width of head,			 	 14
Fore limb.			 	 25
Hud but				 25

An adult female in the Science College Museum (No. 52A) agrees with this species in many points especially in the number of costal folds, which are only eleven. It differs, however, in lacking the fin on the tail. This may be seasonal, and in the absence of precise information as to the seasonal changes of the various species of Hynobius, I am inclined to regard it as belonging to the present species. It measures, total length, 108 mm.; shout to vent, 59; vent to tip of tail, 49; tip of tail to gular fold, 15.5; axilla to groin, 28; width of head, 11.

Habitat. The only locality where this species has been found thus far is Sendai, Hondo, whence came the type and four other specimens in the Science College Museum. A specimen doubtfully referred to this species is from Nikko.

Remarks. In its compressed tail and only eleven costal grooves this new species approaches H. lichenatus. The latter has a very short vomerine series and the fifth toe rudimentary.

List of specimens of Hynobius nigrescens.



HYNOBIUS LICHENATUS 4 (Boulenger).

Plate IV, figs. 1-3

1883. Hynobius licheratus Bot Lenger, Ann. Mag. Nat. Hist. (5), XII. p. 165, pl. v, fig. 1 b (type-locality, Aomori, Hondo type in Brit. Mus.; G. Lewis, collector); Proc. Zool. Soc. London, 1886, p. 413.

With the permission of the authorities of the British Museum I examined the hitherto unique type of this species in 1898. It is chiefly characterized by possessing only eleven costal grooves and only a rudiment of the fifth toe, which is but slightly larger than the one in *H. peropus*. Moreover, the vomerine dentition is quite peculiar in forming only a slight median posterior prolongation. If this character is normal, *H. lichenatus* is the most distinct species in the genus. Its eleven grooves and compressed tail otherwise bring it near to *H. nigrescens*, which, however, has a well-developed fifth toe. Boulenger's original description is herewith appended.

Description of type-specimen.—British Museum; Aomori, Hondo; George Lewis, collector.—In the shape of the series of palatine teeth intermediate between Hynobius and Onychodactylus; these series form a zigzag row, the central or posterior angle not extending posteriorly beyond the extremity of the outer branches; head large. depressed, as broad as long; snout short, rounded; eyes rather large. prominent; no labial lobes; body short, a little more than thrice the length of head; the distance from snout to gular fold contained a little more than twice and a half in the distance from latter to cloaca; limbs moderate; when laid against the body the fingers cross the toes; fingers and toes moderate, depressed; fifth toe rudimentary, as in Hypobius peropus; tail about as long as head and body, strongly compressed and keeled superiorly and inferiorly, ending in a blunt point; skin smooth, shining; eleven costal grooves; a median dorsal groove; parotoids rather indistinct, porous; gular fold strongly marked; a distinct groove behind the angle of the jaws. Brown

a Covered with lichens, referring to the "lichen-like grayish variegation" of color.

[•] Reproduced in this work on Plate IV, fig. 1-3.

above, lighter beneath, with lichen-like grayish variegation; whitish dots on the sides of the body.

Dimensions.

	mm.
Total length	. 74
From snout to cloaca	. 38
Head	. 9
Width of head	. 8.5
Fore limb	. 13
Hind limb	. 14
Hind limb	. 36a

Habitat.—Thus far only a single specimen has been collected at Aomori, near the northern extremity of Hondo.

List of specimens of Hynobius lichenatus.

Brit. Mus. No.	Sex and age.	Locality.	When collected.	By whom collected.
(a)		Aomori, Hondo		George Lewis.

aType; description, p. 36; plate VI, figs. 1-3.

Genus SALAMANDRELLA b Dybowski.

1870. Salamandrella Dybowski, Verh. Zool.-Bot. Ges. Wien, XX, 1870, p. 237 (type, S. keyserlingii).

1870. Isodactylium Strauch, Mém. Acad. Sci. St. Pétersbourg, (7) XVI, No. 4, p. 55 (type, I. schrenckii=S. keyserlingii).

This genus is not represented in Japanese territory, unless it should be found on some of the northern Kuril islands, such as Paramushir or in south Sakhalin. So far as known it occurs only in southeastern Siberia from Lake Baikal to Ussuri and also in southern Kamchatka.

Salamandrella differs from Hynobius chiefly in the complete absence of a fifth toe. In view of the rudimentary state of this member in several species of the latter genus, and its occasional total suppression in individuals, it is a great question whether the genus can be maintained in the future.

SALAMANDRELLA KEYSERLINGII C Dybowski.

Plate V, figs. 7–8.

1859. Triton nov. sp. MAACK, Putesh. Amur (p. 154).

1870. Salamandrella keyserlingii Dybowski, Verh. Zool.-Bot. Ges. Wien, XX, 1870, p. 237, pl. vii (type-locality, southwest corner of Lake Baikal).—
Strauch, Mém. Acad. Sci. St. Pétersbourg, (7) XVI, No. 4, 1870, p. 110.—

a Boulenger, Ann. Mag. Nat. Hist. (5), XII, 1883, p. 165.

b Diminutive form of Salamandra.

c For Count Alexander Keyserling, the Russian explorer and zoologist. Born August 15, 1815, at Kabillen, Kurland; died May 25, 1891, in Dorpat. With Blasius joint author of "Die Wirbelthiere Europas" (1840).

BOULENGER, Cat. Batr. Grad. Brit. Mus., 1882, p. 34 (Shilka; Baikal); Ann. Mag. Nat. Hist. (6), V, Feb. 1890, p. 144 (Khabarovka, Doerries collector).—Mueller, Verh. Naturf. Ges. Basel, VIII, Pt. 2, p. 250 (Khabarovka).—Bedriaga, Wiss. Result. Przewalski Zentralasiat. Reise, Zool., III, Pt. 1, lief. 1, Amph., 1898 (p. 8) (Ksernzo, Prov. Sze-Chuan, China).—Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg, (8) XVII, No. 1, 1905, p. 436 (Yekaterinburg to Kamchatka).—Salamandrella keyserlingi Wolterstorff, Verh. V Internat. Zool. Congress, Berlin, 1901 (1902), p. 585 (Verkhoyansk).

1870. Isodactylium schrenkii Strauch, Mém. Acad. Sci. St. Pétersbourg (7), XVI, No. 4, 1870, pp. 56, 110, pl. 11, fig. 1 (type-locality, east Siberia: Ussuri, Shilka, and Lake Baikal; types in St. Petersburg Mus.; Schrenck, collector).—Sabaneef, Bull. Soc. Nat. Moscou, XLIV, Pt. 2, 1872, p. 275 (Yekaterinburg, Ural).—I. schrenki Shitkov, Zool. Anz., XVIII, May 6, 1895, p. 165 (Yekaterinburg, Ural Mts.; reproduction and development).

1870. Isodactylium wosnessenskyi Strauch, Mém. Acad. Sci. St. Pétersbourg (7), XVI, No. 4, 1870, p. 58, pl. 11, figs. $2a-d^a$ (type-locality, Javina, southern Kamchatka; types in St. Petersburg Mus.; I. G. Wosnessensky, collector).—Salamandrella wosnessenskyi Boulenger, Cat. Batr. Grad. Brit. Mus., 1882, p. 34 (Kamchatka).

1896. Salamandrella uralensis Nikolski, Annuaire Mus. Zool. St. Pétersbourg, I, p. 13 (nomen nudum).

1905. Salamandrella keyserlingii var. tridactyla Nikolski, Zap. Imp. Acad. Nauk, S. Peterburg (8), XVII, No. 1, p. 491 (type-locality, Vladivostok; type Mus. Acad. St. Petersburg, No. 2279; Palchevski, collector).

Until recently S. keyserlingii and S. wosnessenskyi have been considered distinct species. According to Strauch the main differences between them as recognized by him are as follows:

Neither of these characters holds in a large series of specimens.

In seven, mostly well preserved, Kamchatkan specimens which consequently represent S. wosnessenskyi I find both extremes of palatine dentition as described above and figured by Strauch. It may even be stated that the extreme obtuseness of the lateral angles as shown in his figure of the skull^b of the Kamchatkan species is not equaled by any of the specimens at hand, while one, at least (U.S.N.M. No. 31716), has an open median angle and acute anterior angles in excess even of Strauch's figure of S. keyserlingii.

The distinction derived from the alleged lesser elevation of the tail in S. wosnessenskyi also falls to the ground, as an inspection of the subjoined table of dimensions (p. 41) shows. None of my seven specimens has the tail more than nine times as long as high, and only two

a Reproduced in this work on Plate V. figs. 7-8.

b Mém. Acad. Sci. St. Pétersbourg (7), XVI, No. 4, pl. π, fig. 2d.

c Idem., fig. 1.

reach this proportion; in two it is between seven and eight times, while in three it is only seven, the proportion given by Strauch for S. keyser-lingii.

Strauch, in the description of S wosnessenskyi, mentions several other slight characters such as can only be appreciated with specimens of both species for actual comparison. Thus the snout is said to be shorter and much more bluntly rounded; the tongue somewhat shorter in proportion to its width; the lateral and ventral folds to be better developed. The alleged difference in their number, viz, 12 in S. keyserlingii and 13 in S. wosnessenskyi he admits is inconstant, and as a matter of fact I find the latter number to be the exception in my series. Strauch also intimates that the Kamchatkan form has longer extremities masmuch as the fore limbs when bent forward and pressed to the side of the body reach beyond the anterior border of the eye, but this proportion is reached by only one of my specimens (No. 31716); in the others it falls considerably short of this point, and in one (No. 31713) it reaches barely beyond the posterior border of the eye.

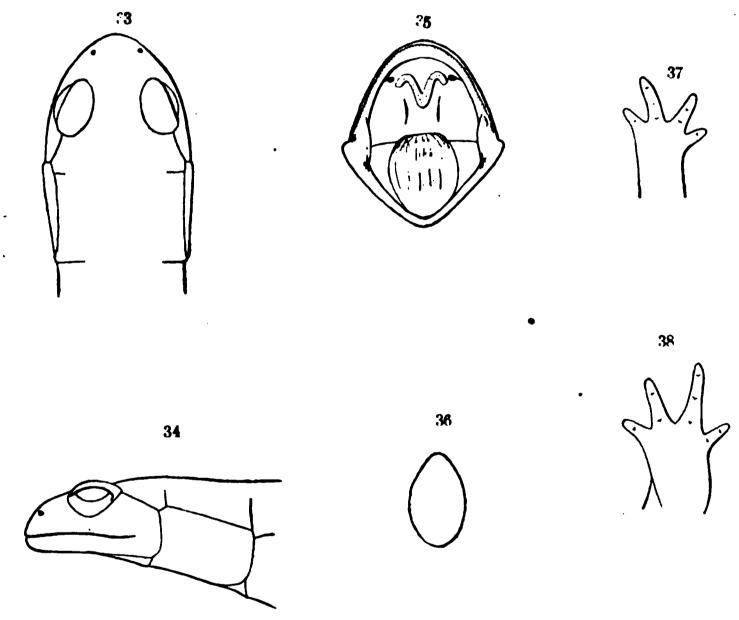
Finally, the coloration seems to be identical in both forms, as I have found nothing in the description of true S. keyserlingii which would separate it from the Kamchatkan form as far as color is concerned.

While thus unable to distinguish the two species from the descriptions, I was unwilling to unite them, as I have only specimens of one of them. I now learn, however, from Professor Nikolski that he has convinced himself not only that S. uralensis, which was published by him as a nomen nudum but also S. wosnessenskyi are identical with S. keyserlingii, and that he has so considered them in his new work "Herpetologia Rossica" (1905). Under these circumstances I can see no reason for maintaining two distinct headings for this species. Prof. B. Shitkov has also informed me (letter of May 18, 1906) that he

regards the S. wosnessenskyi at most as a variety.

Description.—Adult: U.S.N.M. No 22594; Rakovaya Bukhta, Avatcha Bay, Kamchatka, L. Stejneger, collector (figs. 33-38). Vomero-palatine teeth in an angular series, the median angle being directed backward about 45°, and its arms about as long as half the width of the tongue, the lateral retroverted angles much more obtuse, or about 60°; head flat; nostrils about halfway between eye and tip of snout, their distance from each other more than the interorbital width; eye large, upper eyelid longer than interorbital width and slightly wider than one-half the same; body elongate, the head from tip of snout to gular fold being contained three and one-half times in the distance from gular fold to anterior border of vent; fingers and toes of adpressed limbs do not meet by a distance of four costal folds; limbs rather slender, digits short, four on each foot, scarcely webbed at base; tail less than distance from tip of snout to vent, compressed from behind the vent, not keeled, the upper outline straight to the

tip, the lower one parallel with the upper until near the tip, toward which it ascends rapidly; thirteen very distinct costal grooves which are continuous across the belly; median dorsal groove not distinct; parotoid gland large, flat, distinct; a distinct groove from posterior angle of eye to the groove in front of the parotoid, continuing over the gland and behind the latter, joining the gular fold; vent a longitudinal slit with several lateral folds posteriorly, borders swollen. Color (in alcohol), top of head and a broad dorsal band extending the whole length of the tail, as well as the legs above, tawny-olive; sides and entire under surface dirty pale olive-buff; an irregular blackish streak bordering the dorsal band from behind the eye to the tip of the tail; sides of body and tail below this streak blotched and variegated



FIGS. 33-38.—SALAMANDRELLA KEYSERLINGII. 2 × NAT. SIZE. 33, TOP OF HEAD; 34, SIDE OF HEAD; 35, OPEN MOUTH; 36, SECTION OF TAIL AT END OF BASAL THIRD; 37, HAND; 38, FOOT. No. 22504 U.S.N.M.

with blackish; on the middle line of the back a more or less continuous series of blackish dots bifurcating on the nape; on the head numerous similar dots; underside irregularly mottled with dusky.

Dimensions.

•													mm.
Total length	· . ·		 	 	-		 	٠.		•			124
Tip of snout to gular fold			 	 			 						15
Gular fold to anterior angle of vent			 	 			 					-	54
Anterior angle of vent to tip of tail			 	 			 						55
Width of head			 	 					10
Fore leg			 	 	. .		 	٠.	. .	-			16
Hind leg	• • •		 	 	•		 	٠.			• •		18
													6
Width of tail a head-length from		•	 				 			•	• •		4

Variation.—The differences in dentition and proportions of the tail have been alluded to above (pp. 38-39). The coloration is fairly uniform throughout the series, except that in the lot received from Dr. Vladimir Tushoff the median dorsal area is of a frosted silvery gray rather than tawny.

Habitat.—Extends from the Ural Mountains in the west to the Ussuri country and Kamchatka in the east, north to Verkhoyansk, Siberia, and south into the Chinese province of Sze-chuan.

Dybowski collected the types at the southwest corner of Lake Baikal, while von Schrenck brought home specimens from the Shilka, from Ussuri, and also from Lake Baikal. Boulenger has recorded specimens collected by Mr. Doerries at Khabarovka. Dieckmann, in 1894, also obtained it at the latter place and near Vladivostok, the specimens being in the Hamburg Museum (Nos. 865–866). Sabaneef, in 1872, recorded it from Yekaterinburg, on the east slope of the Ural Mountains, where he found it to be common, and Shitkov, in 1895, studied its reproduction and development there.

The Kamchatkan specimens were at one time considered a distinct species. The types were collected by Wossnessensky at the Javina River, on the west coast, not far from Cape Lopatka, the southern end of the peninsula. I myself obtained specimens from the neighborhood of Petropaulski, on the eastern shore, while von Ditmar records the species from the interior, from the valley of Kamchatka, near Tolbatcha, and also from the Uson volcano, near Lake Kronotskoi.^a

According to Nikolski (1905) this salamander has been collected in Sakhalin by Doctor Saprunenko in 1890, the specimen being in the St. Petersburg Museum (No. 1941).

Минени	No	Agar	locality	When col- lected.	By whom col- lected.	Total length.	Spout to gular fold	Gular fold bo	Vent to tip of	Width of head	Height of tail	Height of tall in the middle.
'									. 00290.			TOTAL DESIGNATION OF THE PERSON NAMED IN COLUMN TWO IN COL
St Petersb:		Adulta	Kamchatka	+		108	13	41	54	7.5	5.5	- 5
U S.N.M	22594	dob	Avacha Bay, Kamebatka	1.8665	L Stejneger	124	15	54	54	10	6	-fi
$\mathbf{p}_{0\cdots}$	23531	.do	Paratunka. Kamchatka	1896	, ,do	110	13. 6	147	55	9. 5	6	7
Do	31712	.do ,.1	Kamehatka		Doctor Tushoff	112	14	50	48	8.5	7	7
Do	31713	.do.,	do		do.,	117	14.6	49	53. 5	g	6	0.
Do	21714	do	.do		.do	120	15	53	52	10	7.5	7.5
Dn	31715	do	, do. ,		do	110	15	45	50	9	6	6.5
Do	31716	. ,do .	do		do	99	13	41.6	5-14. 5	. 8	5	16

List of specimens of Salamandrella keyserlingir.

⁵ Description, p. 39, figs. 33-38.

⁶ Beitr. Kenntn. Russ. Reich., VII, 1890, pp. 400, 751.

List of apecua	iens of Salame	mdrella keynerling	gii- Continued.
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Museum.	No.	Ago.	Locality.	When col- lected.	By whom collected.	Total length. Snout to guler Cular fold to	Vent to tip of tail. Width of head. Height of tail at hase. Height of failing the middle.
U.S.N.M	36414	Adult	Paratunka. Kamehatka	1867	N.A. Grebnit-	THERE. MADE OF THE	1966 yr. 200 htt. 200 yr. 140 200 ,
Do	30415	do.	do	18957	do		
Do	30416	do	,do	1987	do		1 1 2
Do	36417	do	de	1887	Cdo		1, 4
Do	36418	.do	do.	18937	do		
Do	36419	.do.	do	1887	do		,
81. Peterah.		dn.e	Lake Baikal		L. v. Schrenck	107 14 44	49 9 6.5 7
	-						

of Typical of S. schrenckit.

Genus ONYCHODACTYLUS« Tschudi.

1838. Onychodactylus Tschudt, Classif. Batr., pp. 57, 92 (type, O. schlegeli).
1839. Dactylony: Bibron, in Bonaparte. Icon. Fauna Ital., II, fasc. xxvi, fol. 131**2 (variant).

1854. Onychopus Duméril and Bibron. Erpét. Gén., IX, p. 113 (variant).

The most remarkable character of this genus is the presence of distinct, compressed, blackish claws, which are even better developed, hooked, and pointed in the larvæ than in the adult. Troschel, in a very elaborate paper on this animal, had the statement that the claws of the adult animal are confined to the males and that the females do not possess them. This is a mistake, as clearly proven by over forty specimens, sixteen of which are females, all possessing as well-developed claws as the males. Apparently Troschel's specimens were not taken during the breeding season, as shown by his description of the vent being a mere slit with swollen lips. It appears then that the males are provided with claws at all seasons of the year, the females only during the breeding time. Only to this extent then is the possession of the claws a sexual character.

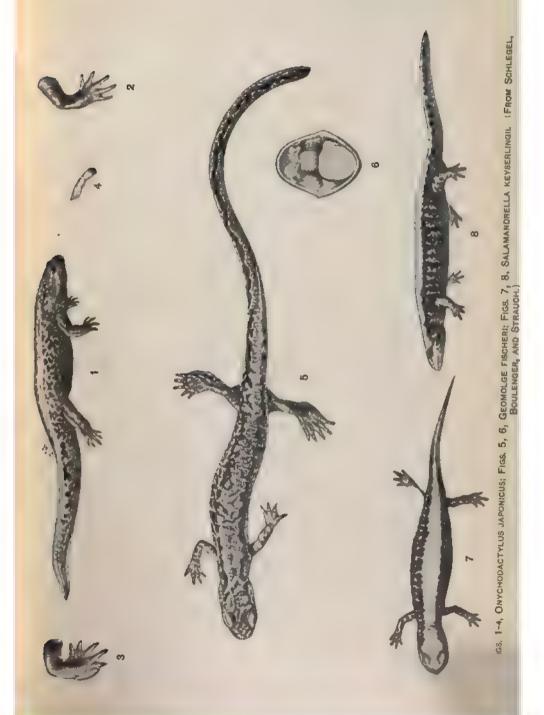
ONYCHODACTYLUS JAPONICUS (Houttuyn).

HAKONE SANSHOUWO.

Plate V, figs. 1/4; plate VI

1782. Salamandra japonica Houttun, Verh Genootsch, Wetensh Vlissingen, IX, р. 329, pl. facing р. 336, fig. 3 (type-locality, Japane Thunberg, collector). – Salamandra japonicas Schneider, Hist, Amph. I. 1799. р. 73. Lacerta japonica Thunberg, Svensk Vet Akad Nya Handl., VIII, 1787, р. 124, pl. tv, fig. 1 (type-locality, Hakone Mis., "Faconic-berget," Hondo: type in Upsala Acad, Mis., Thunberg, collector.

a From Ovet, overes, nail and ôderedos, digit.







ONYCHODACTYLUS JAPONICUS, IFROM SCHLEGEL,)
FUR EXPLANATION OF PLATE SEE PAIR 553.



Onychoductylas japonicus Boxylarte, Icon Fauna Ital II, fase xxvi 1830, fol 131°°, 2 Gray Cat Bair Grad Brit Mus ,850 p 33 pl int fig. 15 Japan Strayen, Mem Acad Sci St Pétersbourg 7. XVI, No. 4, 1870, p 60 Japan Trosener Arch Naturg 1877, 1, p. 199, pl. xv (elaborate descriptions of adult and larva Hillornouge, Shz Ber Naturf Freunde Berlin, 1880, p 121 Hatta village, Hakone Mis Oyama, SW from Yokofiama Borlenger, Cat Batr Grad. Brit Mus 1882, p 35 (Oyama, near Tokyo Hakone — Rein, Japan, Englied 1884, p 188 Hakone Mis Freize, Mitth Deutsch Ges. Ost Asiens, V (1891), p 239 Okada, Cat Vert Japan, 1891, p 65 (Iwaki vicinity of Oyama Hakone Selater, List Batr Indian Mus, (1892), p 37 (Hakone Boetffger, Kat Batr Mus Senekenberg (1892), p 58 (Yokohama

1798. Lacerta (humbergii Donnborg Zool Beytr, III, p. 132 based on Thunberg 1787

1820 Moley struth Merriem, Tent Syst Amph., p. 185 (Japan, based on Houttuy), and Thurberg

1838 Salamandra unquiculata Schlegell, Fauna Japon, Rept., pp. 123, 139, Saur et Batr., pl. v., figs. 1-6 " (Hondo and Shikoku) - Geerts Nouv. Arch. Mus. Paris. 27 V. 1883, p. 275 , Prov. Iga., Mountains of Hakone and Hata.

1838 Onychodactybes schlegeli Tsenr от, Class Batr., p 92 based on Fauna Japon ica — Di мкин and Вівком, Erpét Gen., IX (1854), p 114, Atlas, pl кспі, fig. 1.

1841 Onycopus sicholdii Di Merti, and Bibron, Erpét. Gén., VIII, p. 4 lapsus).

Duméril and Bibron b assert that Schlegel's identification of Houttuyn's Salamandra japonica as the present species is erroneous, but to anyone who examines the original description and figures it must be perfectly plain that Schlegel was correct. There can be absolutely no doubt as to the identity of Houttuyn's species, and the mistake of the authors of the Erpétologie Générale can only be explained by their having confounded figures 2 and 3 on Houttuyn's plate. The latter states that his specimen was collected by Thunberg in Japan. Thunberg himself described and figured the same species under the same name, though apparently without knowing Houttuyn's description, and he expressly gives the Hakone Mountains (Fakonicberget) as the type-locality, consequently it is in all probability also the locality where he obtained the specimen Houttuyn described.

Description. Adult male; U.S.N.M. No. 34240; Hakone Lake, Sagami, Hondo; July, 1898; A. Owston, collector. Vomero-palatine teeth in a doubly arched series behind the choane, the two arches extending forward to a line through the anterior edge of the choane; head flat, rounded anteriorly; nostrils nearer the eye than the tip of the snout, much wider apart than the width of the interorbital space, which is greater than the the upper eyelids; eyes greatly protruding; body elongate, the head from tip of snout to gular fold being con-

Reproduced in this work on Plates V. VI.
b Erpét, Gén., IX, p. 116.

tained three and one-third times in the distance from gular fold to anterior angle of vent; adpressed limbs do not meet by a distance of two costal folds; fore legs slender, the four fingers short, but well developed, each with a raised, compressed, brownish black claw; fourth finger slightly longer than first, third longest; hind legs strong and stout; toes depressed, widened at base, each with a black claw like the fingers; first finger very short, fourth longest, fifth equaling third; a thick dermal expansion from the outer side of fifth finger along the outer side of the foot and tibia, giving the foot a very wide under surface; no tubercles; tail long, longer than head and body, nearly cylindrical in the basal half, then gradually more and more compressed to the end, which is rounded; 13 costal grooves which are rather indistinct; a flat parotoid gland on the side of the neck, bordered above and behind by a groove which begins behind the eye and joins the strong gular fold behind the parotoid; a shallow groove along the median line of upper neck and anterior half of back; vent arrowshaped, the lips of the oblique anterior slits forming the arrows' head distinctly swollen. Color (in alcohol): top of head, the whole median portion of upper neck and back, as well as the upper edge of the tail, "wood brown," sprinkled more or less with blackish brown, most densely on the head; sides of neck, body, and tail blackish brown, the upper outline against the pale band of the back irregular, but very distinct, the lower outline gradually merging into the pale color of the under surface; legs above dark brown, like the lower portion of the flanks, and, like these, with irregular roundish spots of pale woodbrown.

Dimensions.

	116116.
Total length	161
Tip of snout to gular fold	. 16
Gular fold to anterior angle of vent	53
Anterior angle of vent to tip of tail	92
Width of head	10
Fore leg	. 18
Hind leg	21
Height of tail a head-length from vent	. 8
Width of tail a head-length from vent	. 7

The adult breeding female (U.S.N.M. No. 34245; Hakone Lake; July, 1898; Owston, collector) differs from the male chiefly in the shorter tail and the slenderer hind legs, which, moreover, are devoid of the lateral tarso-tibial enlargement. The vent is also of a somewhat different aspect, inasmuch as the lateral oblique folds, which in the male converge at the anterior end, in the female meet at the middle of the median cleft; the lips of the vent anterior to the lateral folds are much swollen; all the toes provided with black nails.

Dimen	sions.			
			ti	n.112.
Total length .		 	 	141
Tip of shout to gular fold				15
Gular fold to anterior border of vent				54
Anterior border of vent to tip of tail				72
Width of head				31
Fore leg				18
Hind leg		 		23
Height of tail one head-length from	vent .			7.5

The nonbreeding female is apparently distinguished by the absence of nails, and the vent is a simple longitudinal slit.

The larex are characterized by the presence of strong, hooked, black claws.

Variation. The variation in structural characters is unimportant and presents no difficulties with regard to the identification of this species, being chiefly confined to slight deviations in the position of the vomero-palatine teeth relative to the choanæ, and to the number of costal folds, which varies between 12 and 14. The coloration is also rather uniform, the chief difference consisting in the varying degree of fineness of the dark sprinkling in the dorsal pale area, where these minute dots often congregate near the median line so as to form an irregular dusky stripe.

Habitat In the Fauna Japonica (p. 125) it is stated that this salamander is found in abundance in the mountainous parts of Hondo and Shikoku, particularly in the provinces of Sagami, Shinano, Tamba, Tazima, and Tosa, and Siebold himself (p. xvi) clearly intimates that he did not obtain it in Kiusiu. Nor am I aware of any record of its having been taken in the latter island. Doctor Fritze states that it is absent in Yezo. Doctor Nozawa, however, in a letter to me enumerates it among the species found there, though as yet he has been unable to secure specimens for me.

To the provinces specifically enumerated above Geerts adds Iga, and Okada adds Iwaki. Most of the specimens in the museums are from Hakone, the type-locality of the species and the locality from which it also takes its Japanese name. Another specific locality from which there are specimens in the British and Berlin museums is Oyama in Sagami province.

The species does not occur outside of Japan proper. It is unknown in the Riu Kiu islands.

List of specimens of Onychodactylus japonicus.

8. N. M. No.	Sex and age.	Locality.	When collected.	By whom collected or from whom received.	
	,	•			mm.
34218	Male	Hakone Lake, Hondo	July, 1898	A. Owston	1
34219	do	do	do	do	. 1
34220		do			
34221		do			
34222		do			
34223	Female	do	do	do	. 1
34224		do			_
34225		do	1		
34226	do	do	do	do	. 1
34227		do			
34228	do	do	do	do	.' 1
34229		do		•	
34230		do		1	
34231	do	do	'do	¹ do	. 1
34232	Female	do	do	do	. 1
34233	do	do	do	do	• • • • •
34234	do	do	do	do	1
34235	Mule	do	do	do	:
34236	do	do	do	do	
34237	do	do	do	do	
34238	do	do	do	do	1
34239	Female	do	do	do	1
34240	Male a	do	do.,	do	1
34241	do	do. 	do	do	1
34242	do	do	do	do	1
34243	do	do	do	do	1
34244	Female	do	do	do	1
34245	\dots do b	do	do <i>b</i>	do	
34246	do	do	do	do	;
34247	do	do	do	do	1
34248	Male	do	do	do	1
34249		do			
34250		do			
34251		do.,			
34252		.do.,			
34253		do			
34254		. do			
34255		do			
		do			
		do			
34258				•••••••	•
	5	. do	•	•	

a Description p. 43.

 $[^]h$ Description p. 44.

Genus GEOMOLGE Boulenger.

1886 Geomolge BOULKNOFR, Proc Zool Soc. London, p. 416 (type, & fischer)

Geomolge appears to be very closely allied to Onychodactylus, the chief differences being that in the former the vomero-palatine series of teeth is interrupted in the middle and that it lacks the black, horny claws.

GEOMOLGE FISCHERI b Boulenger.

Plate V, fig. 5-6.

1886 Geomolye fischeri Bollenger, Pred Zool Soc London, 1886, p. 416, pl. xxxx, fig. 2 c (type locality, Khabarovka, 1 ssuri (types in Brit, Mus. no. 86-5-15-11-12, Doerries, collector Ann Mag Nat Hist (6, V, Feb., 1890, p. 144 — Nikolski, Annuaire Mus Zool St Petersbourg, I, 1896, p. 77 - Valley (f Sutchan River, I ssuri district St Petersbourg, No. 1904; Busse, collector) - Zap - Imp. Akad Nauk, S. Peterburg, 85, XVII, no. 1, 1905, p. 440 (Ussuri

There being no specimen of this species in the U. S. National Museum, an abstract of Boulenger's original description is given:

Physiognomy that of Onychodactylus japonicus. limbs in every respect similar to those of Onychodactylus japonicus save the absence of claws; the male likewise with tibio-tarsal dilatation; . anal opening subcruciform, as in Onychodactylus; skin smooth: 14 or 15 costal grooves, parotoids and gular fold as in Onychodactylus Brown above, with blackish variegations, most crowded on the sides, which also bear some whitish spots; lower surface brownish white.

	Male	Female
	1/1 111	mm
From sno it to vent	70	80
Head	12	14
Tail	93	ef

Habitut. This species was collected by Mr. Doerries near Khabarovka, in the Ussuri. Nikolski has since recorded a specimen from the valley of Sutchan River, also in the Ussuri district. Beyond this nothing is known of the distribution of this species.

Order SALIENTIA.

1768 Saluentia Laurenti, Syn. Rept., p. 24

1777 Ecandata Scorott, Introd Hist Nat p 464

1788 Batcach Barsen, Anlest Kennth Thiere Mineral Tep 437)

1802 Rann SHAW Gen Zool , HI Pt 1, p 5

1806 Econdate DUMERII Zood Anal p 92

Reproduced in this work on Plate V

[&]quot;From Fit, the earth, land, and the generic term Molor Merrem a synonym of Trateries Raimesque, derived from the German word Molch, a salamander

⁶ Named in Lonor of Dr. Johann Gustav Fischer, the well-known Hamburg largetologist. Born on March 1, 1819. died en January 27, 1889.

d Boulenger, Proc. Zool Soc. London, 1856, p. 416.

- 1813. Anuri Fischer, Zoognosia, 3 ed., I, p. 58.
- 1825. Anoura LATREILLE, Fam. Nat. Règne Anim., p. 104.
- 1828. Pygomolgan Ritgen, Nova Acta Acad. Leop. Carol., XIV, p. 278.
- 1828. Acerci WAGLER, Isis, 1828, p. 859.
- 1832. Batrachia MUELLER, Isis, 1832 (p. 504).
- 1833. Miura van der Hoeven, Handb. Dierk., II, Pt. 2, p. 307
- 1835. Heteromorpha Fitzinger, Ann. Wien Mus., I, p. 107.
- 1839. Raniformia Hogg, Mag. Nat. Hist. (n. s.), III, p. 271.
- 1855. Batrachii van der Hoeven, Handb. Dierk., 2 ed., II. p. 468.
- 1866. Anura HAECKBL, Gen. Morphol., II, p. CXXXII
- 1878. Acaudata Knauer, Naturg. Lurche, p. 100.

The name adopted for this order varies greatly with the various authors. Thus Salientia, Anura, and Ecaudata are used almost indiscriminately. Of these Salientia is the oldest.

It is perfectly true that the various rules for zoological nomenclature do not compel a strict application of the law of priority to groups higher than genera, and that the A. O. U. code specifically proclaims this, but the principle underlying the modern way of fastening a name to a genus is very different from that involved in naming an order or a class. The ends in view are different, and the modus operandi must also be different. Nobody nowadays in applying a generic term cares the least whether the name, as originally proposed, covers the same aggregate of species, even approximately, as the genus to which he attaches it, or not. It is enough that a single species, the type species, is included in the original group and in the one adopted. This, however, is a comparatively modern view. In the early days, when generic terms were few, and long before the term "type-species" or "genotype"(!) was invented, it happened quite frequently that authors selected a new generic name for a group which contained the essential elements of one previously named, simply because his grouping was not coextensive with that of his predecessor's. But as new discoveries and closer studies multiplied the genera, and the views as to their compass became more and more divergent, it was found impossible to adhere to such a principle as far as generic terms were concerned.

Not so with the terms for orders and classes. It has always been the recognized custom to employ a name embracing, at least approximately, an assembly of genera, or orders, coextensive with it when first proposed. The inconvenience caused by the coining of new names of groups higher than genera has been small compared to the convenience of knowing approximately the extent of a group by the name applied to it. A good reason why it is inconvenient and mexpedient to apply strictly the law of priority to such higher groups is the fact that we know no such thing as a "type genus" or a "type order" by the aid of which the name of the order or the class can be arbitrarily fixed, even if it were desirable to do so.

As a general proposition it may be stated that there is but little divergence among authors with regard to the names of classes and orders. Common usage has in most cases been too strong for the extremists, who have either tried to apply names according to priority or who have inflicted new ones every time the "rank" of the group was changed or a trifling component part shifted from one group to another, or whose fine linguistic sensitiveness compelled them to improve the name and render its form "classic." There are names which it has been impossible to dislodge, which are employed almost unanimously. These it would be folly to attempt to disturb.

The principle which has guided me in selecting the names of orders and classes may be stated briefly as follows: In cases where a term has not received a practically universal acceptance the oldest known group name (above a generic name and later than 1758) is applied, which covers approximately the same aggregate of genera, irrespective of the comparative rank assigned to the group by the original namer, provided its form is not the plural of a current genus in the same class, nor that now universally adopted for superfamilies, families, and subfamilies.

The application of this principle may be shown by a few examples. Thus Salientia is adopted as being the oldest known group name for the present order, because when originally proposed it covered the same aggregate of genera as now, and none of the later names of the same compass have received universal acceptance. On the other hand, Gradientia has been rejected, although it is older than Caudata, and the latter adopted, because the term Gradientia, as originally proposed, embraced the saurian reptiles as well. Oppel's Squamata has been accepted for the reptilian order containing the lizards and snakes, although it included the crocodiles, a discrepancy too slight to affect the general applicability of the term. Again, Testudinata, although proposed four years later than Link's Cataphractæ, has been accepted in preference to the latter (after the elimination of the older terms Testudines and Chelonia as conflicting with the earlier or synchronous generic names Testudo and Chelonia) because of the comparative currency of that term, as against the almost total obscurity of the one coined by Link. Finally, the suborder containing the soft-shelled turtles is called Chilotæ in spite of the fact that the term Trionychoidea is both earlier and commonly adopted, the reason for the rejection of the latter name being that its form is identical with that of the superfamily.

The Salientia may be divided into three suborders, viz, Aglossa, Linguata, and Costata, of which the first one is distinguished by having the eustachian tubes united into a single pharyngeal opening and no tongue, while the last one is amply characterized by the presence

of ribs. The Aglossa are only found in Africa and South America; the other two suborders are represented within our area.

Suborder COSTATA.

1879. Costati Lataste, Act. Soc. Linn. Bordeaux, XXXIII, 1879, p. 339.

Salientia having a tongue; eustachian tubes, when present, with two pharyngeal openings; ribs present and a pair of transverse processes near the proximal end of the coccyx. Larvæ with one spiraculum in the middle of the thoracic region.

The Costata, which embrace only one family, the Discoglossidæ, have a very wide and disconnected distribution showing their great antiquity and fully bearing out the verdict of Professor Howes, based upon anatomical investigations, that they are "by far the least modified of living anura."

The principal center of distribution at present is central and southern Europe, where three genera together with five species are at home, one of these species extending its range into northwestern Africa and another into central Russia. At the other extreme of the Palearctic region another species of one of the European genera maintains its isolated existence, namely, the species to be treated of in this work, while in the Yunnan region another one has recently been discovered. Two more genera belong to this family, both widely removed from the above, namely, Liopelma, the single species of which is the only batrachian occurring in New Zealand to which antipodal island group it is peculiar and where it seems to be very rare, and Ascaphus, represented thus far by two specimens only, of a single species, A. truei, which has recently been discovered in the State of Washington, not far from the Pacific coast. The extreme rarity of the last two species would seem to indicate that they are nearing extinction.b

Family DISCOGLOSSIDÆ.

Only this family is included in the suborder.

Genus BOMBINA Oken.

- 1816. Bombina Oken, Lehrb. Zool., II, p. 207 (type, Rana bombina).
- 1820. Bombinator Merrem, Tent. Syst. Amph., p. 178 (same type).
- 1830. Bombitator Wagler, Nat. Syst. Amph., p. 206 (emendation).

^a Proc. Zool. Soc. London, 1888, pp. 178, 506.

^b See Stejneger, A Résumé of the Geographical Distribution of the Discoglossoid Toads in the Light of Ancient Land Connections, in Bull. Amer. Geogr. Soc., XXXVII, No. 2, Feb. 1905, pp. 91-93; and The Geographical Distribution of the Bell-Toads, in Science (n. s.), XXII, Oct. 20, 1905, p. 502.

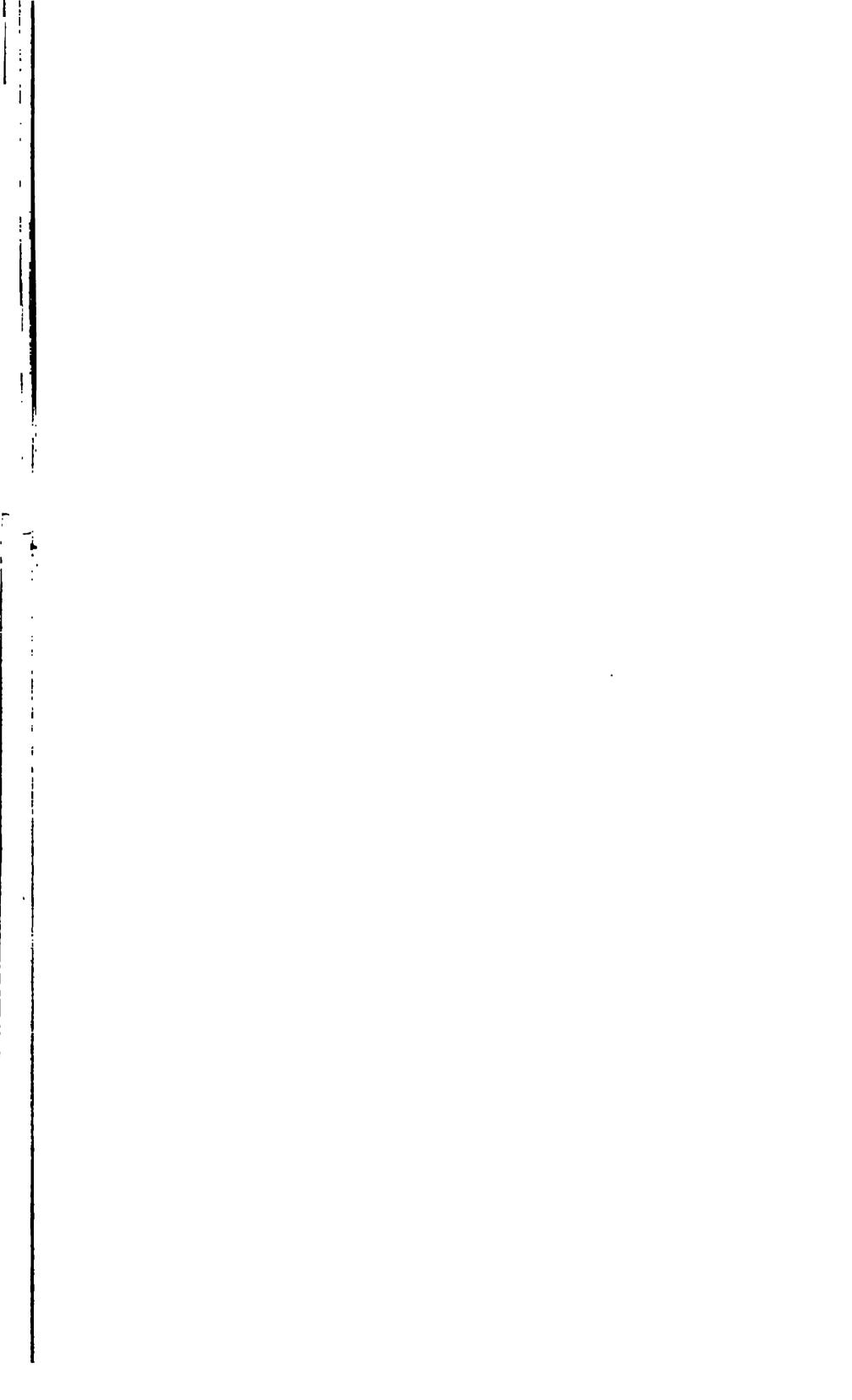
From the medieval Latin verb bombinare, to utter a bombus, a loud hollow sound, such as the stroke of a bell.





BOMB NA ORIENTALIS. (FROM BOULENGER,)

FUR EXPLANATION OF PLATE SEE PAGE 654



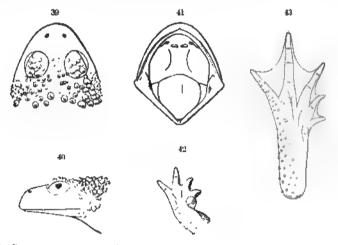
The genus Bombina has a very curious distribution. Two species, Bombina bombina (Linnæus) and Bombina salsa a (Schrank), occur in Europe, the former in northern and eastern central Europe. The latter, which seems to embrace several local forms, such as B. salsa pachypus (=Bombinator apenninicus Gistel and Bronne, 1850), in Italy, B. salsa nigriventris (Dueringen) in Bosnia and Montenegro, B. salsa kolombatovici (Bedriaga) in Dalmatia, etc., occupies France, parts of southern central Europe, Italy, and the Balkan peninsula. None of these species extends eastward beyond the Volga. A third species of the genus occurs in eastern Asia, though probably not to the west of a line through Lake Baikal. A fourth species, Bombina maxima, has recently been described from Yunnan at an altitude of 6,000 feet.

BOMBINA ORIENTALIS b (Boulenger).

Plate VII.

- 1878. Bombinator igneus Martens, Preuss. Exped. Ost-Asien, Zool., I, p. 384 (not of Laurenti) (Chefu, N. China).—Boulenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 447 (part: Chefu, China).—Boettger, Offenbach. Ver. Naturk. 24-25 Ber., 1885, p. 164 (Chefu).
- 1890. Bombinator orientalis Boulenger, Ann. Mag. Nat. Hist. (6), V, Feb. 1890, p. 143, pl. ix, fig. 2¢ (type-localities, N. China, Korea, Khabarovka; types in Brit. Mus.); Proc. Zool. Soc. London, 1890, p. 326 (Chefu; Korea; Ussuri).—Werner, Abh. Bayer. Akad. Wiss., (Muenchen) II Klasse, XXII, Pt. 2, 1904, p. 359 (Tsingtau, China).—Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg, (8) XVII, No. 1 (1905) p. 415 (Vladivostok; Korea, etc.).
- **Description (figs. 39-43).—Adult male; U.S.N.M. No. 17522; Fusan, Korea; 1885; P. L. Jouy, collector. Vomerine teeth in two
- a In his Tailless Batrachians of Europe, p. 322, footnote, Doctor Boulenger, in adopting the sixteen years younger name Rana agilis in preference to the older R. dalmatina, as required by "the strict application of the law of priority," pleads that "this is one of those cases in which, it appears to me, conservatism is desirable," and he continues: "Similar considerations have guided me in the naming of the two species of the genus Bombinator, and I hope, in the interest of stability of nomenclature they will commend themselves to future workers." It is indeed not uncommon to hear the breaking of this law termed "conservatism," and certainly the conservatives ought to know if that is a correct definition, but we radicals prefer to submit to the law as the only means of obtaining the desired "stability of nomenclature." If Boulenger, in the two cases cited, had followed the law we would by this time have reached stability in their cases, while now it has been postponed probably for a generation. Who is to decide in which cases it is allowable to break the law and substitute "conservatism?" A simple "it appears to me" applied here and there by a dozen herpetologists would cause a fine "stability!"
 - b Eastern.
 - c Reproduced in this work on Plate VII.

small transverse oval groups behind the level of the choans; tongue oval, truncate behind, large, adherent all around; snout flat, rounded, without canthus rostralis; nostrils on top of snout about halfway between eye and tip of snout, distance from each other equaling the interorbital space, which is narrower than the upper eyelids; no tympanum; parotoid gland long, narrow, indistinct; no gular sac; a very faintly indicated gular fold; fore leg well developed, longer than half the length of head and body; fingers short, depressed, first shortest, third longest, second and fourth of about equal length; no subarticular tubercles, but a large and distinct inner palmar pad and a smaller indistinct outer one; a large patch of horny nuptial excrescences on the inner side of the fore arm, and smaller patches on the inner side of the large palmar pad, and of first, second, and third toes; when hind leg is carried forward along the side, the heel reaches



Figs. 29-43. Bombing orientalis of Nat Size 20 rel of Gead 40 side of head; 41, open mouth 42 underside of right hand showing nutral excresses, 43, foot. No. 17522, U.S.N.M.

the corner of the mouth and tarso-metatarsal joint slightly beyond the tip of the snout; tibia equals distance from base of inner metatarsal tubercle to tip of longest toe; heels just meet when the femurs are placed at right angles to the axis of the body; toes short, webbed nearly to their tips, webs deeply excised, third toe longer than fifth; no subarticular tubercles; inner metatarsal tubercle small and weakly developed, no outer tubercle; no nuptial excrescences on toes; upper surface covered with closely set and irregularly arranged prominent tubercles of varying size, all sprinkled over with minute, dark brownish points and each surmounted by one or more horny spines, the base of which is pale and the tip blackish brown; underside smooth, with the posterior part of the belly and proximal parts of femure somewhat rugose; outer side of sole of feet and underside of base of fifth toe with spines like the upper side.

gray, with irregular obscure dusky spots and dusky cross-markings on the limbs; a pale sage-green spot of irregular outlines across the back between the fore legs and two smaller ones, still more indefinite on each side of the back about the middle; a pale longitudinal stripe on the tip of the snout from the level of the nostrils to the lip; lips dusky; underside pale buff (red in life), with numerous blackish, sharply defined, irregular spots; palms buff (red), separated from the similarly colored under surface of the fore arm by a black wristband; a large buff (red) spot on the inner side of the plantar surface, involving the entire first toe, below and above, and continuous with the similarly colored patch on the inner side of the tarsus; tips of all the digits abruptly and bright buff (red) above and below.

Dimensions.

	716	114.
Tip of snout to vent	4	14
Tip of snout to gular fold	1	6
Width of head	1	6
Width of interorbital space		3
Fore leg.	2	25
Hind leg, from vent		
Foot from base of inner metatarsal tubercle to tip of longest toc		

Sexual variation.—The males of this species during the breeding season possess groups of blackish horny excrescences on the inner side of fore arm, palmar tubercle and first, second, and third fingers exactly as in Bombina salsa; but, unlike the latter, there are none on the posterior extremities. In the female the fingers are longer and slenderer, especially the outer one. The dorsal spines and asperities are smaller.

Color variation.—In the series before me there is very little deviation from the coloration of the underside as described above. In two specimens, Nos. 17527 and 17530, the blackish markings are larger, especially in the latter, in which the underside may be described as black with buff (red) spots; in both, the plantar light patch is separated from the tarsal patch by a narrow black bridge, in No. 17530 only on one foot, however. The upper surface is considerably more olive in some specimens and the dusky spots and markings above much better defined and darker.

Habitat.—The eastern bell-toad is confined to northeastern China, Korea, and the Ussuri country. Specimens from all of these localities are in the British Museum. The U. S. National Museum possesses nine specimens collected in 1885 by P. L. Jouy near Fusan, Korea. Pleske's specimens from Vladivostok are in the Academy Museum in St. Petersburg, and the Hamburg Museum also has it from the same locality (No. 862), collected by Dieckmann in 1894. In the St. Petersburg Museum there are also specimens collected by Poljako at the Novgorodski Port, Possiet Bay.

List of	of s	s vecimens	of	Bombina	orientalis.
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J. S. N. M. No.	Sex.	Locality.	When col- lected.	By whom collected.
7522	Male a	Fusan, Korea	1885	P. L. Jouy.
7523	do	do	1885	Do.
524	do	do		Do.
525	do	do		Do.
52 6	do	do	1885	Do.
527	do b	do	1885	Do.
528	do	do	1885	Do.
529	Female	do		Do.
530	Male b	do	1885	Do.

a Description, p. 51; figs. 39-43.

b P. 53.

Suborder LINGUATA.

1845. Linguata Gravenhorst, Thierreich, p. 43.

1847. Phaneroglossa Gervais, Dict. d'Hist. Nat., IX, p. 721.

Salientia having a tongue; eustachian tubes with two pharyngeal openings; lacking ribs and transverse process to urostyle. Larvæ with one spiraculum on left side only.

The term Ranæ phaneroglossæ used in 1830 by Wagler (and usually quoted simply as "Phaneroglossa") included the majority of both Salientia and Caudata. Duméril and Bibron first restricted the "Phanéroglosses" (first latinized by Gervais in 1847, so far as I have been able to ascertain) to the Salientia with a tongue, therein including also the Discoglossidæ. Those who still regard these as belonging to the same suborder as the other tongued Salientia will probably retain the name Phaneroglossa. Gravenhorst's Linguata may then be restricted to the latter without the genera having ribs. Originally, it is true, it was meant to be equivalent to the Phanéroglosses, but it has never been accepted for them, and the Discoglossidæ form so small a portion that it is better to retain it as here defined than to create a new name.

The families to which the toads and frogs inhabiting our region belong may be distinguished as follows:

KEY TO FAMILIES.

- a² Clavicles and coracoids of both sides firmly united by a single median cartilage.
 - b¹ Both jaws toothless; sacral diapophyses dilated................ЕмдуятомирÆ
 - b² Upper jaw toothed; sacral diapophyses not or but slightly dilatedRANIDÆ

The characters of the two groups indicated by a^1 and a^2 correspond to those of Cope's Arcifera and Firmisternia, respectively, divisions which Boulenger calls "series."

As the employment of the systematic arrangement given above for purposes of identification would necessitate dissection of the specimens, I add the following artificial Key, by which the Salientia occurring within our limits may be referred to their respective families by external characters alone:

KEY TO THE JAPANESE FAMILIES OF TAILLESS BATRACHIANS.

a Digits without subarticular tubercles; pupil triangular (Su	border Costata)
	Discoglosside, p. 50
a ² Digits with subarticular tubercles; pupil round or horizontal	(Suborder Linguata).
b1 A parotoid gland	Bufonidæ, p. 55
b ² No parotoid gland.	
c1 Tongue without posterior prolongations or "horns."	
d ¹ Upper jaw toothed	
d ² Upper jaw toothless	
cº Tongue with two posterior horn-shaped prolongations	RANIDÆ, p. 92

Family BUFONID.E.

A large family having no maxillary teeth, a large parotoid gland behind the head, shoulder-girdle arciferous, and lateral sacral processes dilated. Distributed over the entire globe, except the polar regions, New Zealand, and Polynesia. Some forms are aquatic, some arboreal, some burrowing in their habits, but most are terrestrial. They feed largely on insects, and are among the best friends of the farmer and gardener, by whom they ought to be protected instead of persecuted and exterminated, as they usually are, on account of their often unattractive appearance.

Only one genus is represented within the territory covered by this work.

Genus BUFOa Laurenti.

- 1768. Bufo Laurenti, Syn. Rept., p. 25 (type, B. vulgaris).
- 1788. Buffo Lacépède, Hist. Nat. Quadr. Ovip., I, Syn. Meth. (emendation).
- 1814. Batrachus Rafinesque, Specchio Sci., (Palermo), II, fasc. 7 (substitute for Bufo).
- 1815. Bufotes Rafinesque, Analyse Nat., p. 78 (substitute for Bufo).
- 1816. Calamita Oken, Lehrb. Zool., II, p. 209 (type, B. calamita; not of Schneider 1799).
- 1828. Chascax RITGEN, Nova Acta Acad. Carol. Leop., XIV, p. 278 (type, Bombinator strumosus).
- 1843. Phryne Fitzinger, Syst. Rept., p. 32 (type, B. vulgaris).
- 1843. Phrynoidis Fitzinger, Syst. Rept., p. 32 (type, B. asper).
- **1864.** Epidalea COPE, Proc. Phila. Acad., 1864, p. 181 (type, B. calamita).

The above synonyms are based upon species occurring within our limits or are additional to those found in previously published synonymies. The other synonyms of *Bufo* are too numerous to be reproduced here.

The status of the Japanese toads is still very unsatisfactory.

It will be remembered that Schlegel, in Fauna Japanica, described the toad of Japan as a variety of the European toad, to which he attached the name Bufo vulgaris japonicus, suppressing Boie's name B. prætextatus, as he says, "because of the great affinity which this toad has to that of Europe, of which it is the representative in Japan." The differences indicated by him are chiefly those of coloration.

Camerano, in 1879, found the differences to be of such a character as to induce him to regard the Japanese toad as a species, Bufo japonicus, his principle being that any well-defined local form should be so considered. His material consisted of 18 specimens in the Zoological Museum at Turin, nearly all being from Tokyo and Yokohama.

In the following year, 1880, we find both Lataste and Boulenger treating of the subject. The former, who examined fourteen specimens from Peking and two specimens from Japan (lent him by Camerano), expresses himself in favor of recognizing a Bufo vulgaris japonicus, while the latter, with sixteen specimens from various Chinese localities and five Japanese, pronounced in favor of an undivided Bufo vulgaris. The chief characters, he stated, are the more prominent and spinous warts and the black horny layer on various parts of the body, the rather larger head, and the blackish stripe on the flanks. None of these characters appears to him to be constant, and he adds that if the Japanese form should be separated from the European it should certainly also be separated from the Chinese: "But I do not think that distinction necessary." This conclusion he adhered to in his Catalogue of Batrachia Salientia, issued two years later. It should be noted, however, that in the description of the species he was obliged repeatedly to make exceptions for Chinese or Japanese specimens.

Additional material did not alter his view, for, in 1890, in a paper on the reptiles and batrachians of Amurland, he treats of $Bufo\ vulgaris$ in the following language:

Its eastern range extends over nearly the whole of China and Amoorland and Japan. The differences between European and Japanese specimens, which consist chiefly in the greater size and perfect distinctness of the tympanum, the black lateral stripe. and the deep black spots or marblings of the lower parts in the latter, are completely bridged over by the Chinese and Manchurian specimens. Specimens from Ichang. on the Yangtse Kiang, and Ningpo come nearest the Japanese, from which they do not differ in coloration; but the tympanumealthough as distinct, is not so large. Specimens from Shanghai, Chefoo, Peking, and Korea are intermediate between the latter and the European; the tympanum is always very distinct, but varies considerably in size; the dark lateral stripe is usually ill-defined or absent, and the belly may be either largely spotted with black or almost immaculate. Judging from the two specimens collected at Chabarowka by Hr. Dorries, the northernmost form is still nearer the European, the tympanum is rather small, but perfectly distinct, the belly is immaculate, and the coloration might be said to be identical with that of European specimens, but for the presence of traces of a light vertebral line, as is often found in specimens from Japan. Korea, and Northern China

This statement is almost literally repeated in his latest work on the Tailless Batrachians of Europe (1898).

In the meantime (1883) he had described and figured a Bufo formosus from two specimens collected by the Challenger Expedition at Yokohama, which "in its general characters agrees with Bufo vulgaris, especially the Japanese form." The main distinctions relied on are the large size of the tympanum, the greater length of the hind leg, the more clongate digits, more excised webs of the hind foot, and the shortness of the first finger.

Nothing more is heard of this species. In the subsequent discussions of the "Japanese form" of Bufo vulgaris there is not the slightest reference to it. The fact, however, that the name is not included in Boulenger's synonymy of Bufo vulgaris in his Tailless Batrachians of Europe, nor the types in the list of specimens appended, seems to indicate that he still maintains its distinctness, although some doubt arose in my mind upon seeing that in the appendix to the latter work he enumerates a specimen from Dagoshima, collected by Doctor Anderson in May, 1884, under Bufo vulgaris. To me this specimen, which the authorities of the British Museum kindly allowed me to examine in 1898, is a strongly marked Bufo formosus with the types of which I compared it.

Much of the uncertainty is probably due to the confusion of these two toads in Japan. Thus, on examining the large series in the Leiden Museum upon which Schlegel founded his Bufo vulgaris japonicus, I discovered that he had both forms before him. I think it is also certain that Camerano based his conclusion of the specific distinctness of Bufo japonicus, or B. prætextatus, as he called it in his elaborate paper of 1901, upon true Bufo formosus.

The status of the Japanese toad resolves itself into three queries:

- (1) Is there more than one species of Bufo in Japan?
- (2) Is one of these identical with the species on the mainland?
- (3) In case of different forms being recognized, what names are to be employed?

First, then, are there more than one species of Bufo in Japan proper? In the material which I have had an opportunity to examine, viz, 13 specimens in the Leiden Museum, 9 specimens in the British Museum, and 36 in our own National Museum, there appear to be three forms. One has larger tympanum, longer limbs, slenderer digits, much more deeply excised webs, longer and narrower parotoids, and, as a rule, the first finger shorter than the second. This is the so-called B. formosus. That we have not to do with sexual or seasonal differences seems plain. Thus the males with the nuptial asperities on their fingers, which under this assumption would have the greatest extent

a Probably Dogashima, near Miyanoshta.

of web, on the contrary show a minimum size of the interdigital membranes.

A very similar form, possibly confined to Shikoku, having the deeply excised webs, long parotoids, long limbs, and slender digits, is very near to B. formosus, but has a much smaller tympanum and first and second fingers subequal.

The third form is characterized by small tympanum, stouter and shorter limbs, much larger webs, the true B. japonicus.

In spite of the general similarity in coloration and otherwise it is difficult to escape the conclusion that the Japanese toads represent three more or less distinct forms, and as it is at present impossible to establish their interrelationship clearly it is thought best to designate them by binominal appellations. The great difficulty arises in ascribing definite geographical limits to them. Unfortunately, a large number of the specimens examined are without indication of their exact origin. Thus all the specimens in the Leiden Museum collected by Buerger and von Siebold are only labeled "Japon." Several in the British Museum are similarly deficient. The only true B. japonicus with a definite locality attached seems to be one from Kobe in the British Museum and one from Miyakoshima in Science On the other hand, it would almost appear as if all College Museum. the B. formosus of which the exact locality are known came from near Tokyo and Yokohama (Camerano's specimens; types in British Museum; specimens in United States National Museum) and Dagoshima, wherever that locality may be. a We have thus an indication of the B. formosus being eastern and northern, while the one with the larger webs, etc., may be more western.

Finally, the only authentic locality from which I have seen specimens of the new form, further on described as B. smithi, is the island of Shikoku. There is a specimen in the Imperial Museum in Ueno Park, Tokyo, apparently belonging to this form, which was in a bottle with the type specimen of Polypedates ishikawa and said to have come from Okinawa shima, Riu Kiu. As no toad has been recorded by any collector from that archipelago, the locality given becomes very doubtful.

The next question then is whether any one of the forms which we thus recognize as occurring in Japan is identical with the toads occurring on the mainland. I have already quoted Boulenger to the effect that there are several forms, though he does not recognize them by name because they intergrade. Let it be understood at once that the form in Japan most remote from the mainland forms is B. formosus. It is consequently the so-called B. rulgaris japonicus, i. e., the one with the greater webs, shorter parotoids, shorter legs, etc., which

a If Dogashima is meant, as surmised by me, the locality agrees well with the others.

comes nearest to the mainland forms. Boulenger then maintains that this form approaches the Chinese specimens from Ningpo and Yangtse-Kiang, while the Shanghai, Chefu, Manchurian, Korean, and Ussuri specimens are intermediate between the Japanese form and the true European Bufo vulgaris. The differences are chiefly those of color, and the relative size and distinctness of the tympanum. Thus Boulenger, in discussing the characters of Buto formosus asserts that a black line bordering the lower lip "is constant in the Japanese specimens of B, vulgaris, absent in the continental specimens." On the whole, my own observations corroborate those of Boulenger: yet while it is admitted that the separating characters are somewhat vague and uncertain, it is considered best to recognize the various local forms for the present at least until more abundant and more reliably labeled material shall have been accumulated. It may then be expedient to recognize three oriental forms of the common European toad, one from eastern South China, one from northeastern China, Korea and Amurland, and one from Japan. The status of a fourth one, B. sachalinensis, is more uncertain vet.

The third and final question now arises as to the names to be applied to these forms. As for the Japanese form, the question is somewhat intricate because of the occurrence of several forms or species in the islands. Unfortunately there is nothing in Boie's description of Bufo pratestatus by which it can be decided which of these he had before him, and as the type is not in existence, his name may be left out as unidentifiable. Schlegel's material upon which he based his Buto vulgaris paponicus, as has been shown, was composed of specimens of both forms. The illustrations in Fauna Japonica, although very good, fail to throw much light on the question, for while the full figure apparently represents the short-webbed form (B, formosus), the profile of the head seems to be taken from a specimen with a smaller tympanum, possibly from a B smithi. The illustrations as well as the description and the type-material consequently are composite. It would then seem that Boulenger's action in describing the short-webbed form as Bujo formosus and relegating B. rulgaris japonicus to B. rulgaris should not now be undone, and that the names must stand as he restricted them,

The South China form must stand as Bufo bufo gargarizans (Cantor)^a while the North China form probably is properly named Bufo bufo asiaticus (Steindachner), as Boulenger refers the Shanghui specimens to the same category as the Chefu and Manchu, an ones

^{#1842} Bufo garque, ans Caston Ann Net Hist, IN Aug 1842 p 483 (ype-locality, Chusan China (ypes in Bri Mus.)

^{1860 **} Bufo griscus HALLOWELL, Proc. Phale Acid. 1860 p. 506 type-locality marshes of Whampon, Hongkong. Stringson, collector

The Japanese and North China forms and species may be distinguished as follows:

KEY TO THE SPECIES OF BUFO IN JAPAN, FORMOSA, KOREA, AND SIBERIAN COAST PROVINCE.

- a^{-1} Top of head without bony ridges.
 - b^{\perp} Inner edge of tarsus rounded, tubercular, with no sharp cutaneous fold.
 - c^1 Web between toes extending only as far as first basal phalanx o. third toe and one-half the first basal phalanx of fourth (fig. 48).
 - d^{\pm} Diameter of tympanum about twice as large as its distance from the eye.....
 - Bufo formosus, p. 60
 - d² Diameter of tympanum about equals the distance from the eye............

 Bufo smithi, p. 64
 - c^2 Web between toes extends as far as end of the two basal phalanges of third toe and first basal phalanx of fourth.
 - d^{\pm} Underside uniform pale, or with small black spots.....
 - Bufo bufo asiaticus, p. 66

BUFO FORMOSUSb Boulenger.

Plate VIII.

- 1838. Bufo vulgaris japonicus Schlegel, Fauna Jap., Rept., pp. 106, 139 (Japan; specimens in Leiden Mus.; part only); Sauri et Batr., pl. п, fig. 6.
- 1876. Bufo vulgaris var. prætextatus Martens, Preuss. Exped. Ost-Asien, I, p. 384 (Yokohama) (not of Boie?).—Hilgenborf, Sitz. Ber. Ges. Naturf. Fr. Berlin, 1880, p. 120.
- 1879. Bufo japonicus Camerano, Atti Accad. Torino, XIV, Pt. 5, Apr., 1879, p. 884 (Yokohama; Tokyo; Mus. Zool. Turin; Aimonin and Fontanesi, collectors).
- 1883. Bufo formosus Boulenger, Proc. Zool. Soc. London, 1883, p. 140, pl. xxiii.c (type-locality, Yokohama; types in British Museum; Challenger Exped. collect.)—Okada, Cat. Vert. Jap., 1891, p. 66.—Boettger, Kat. Batr. Mus. Senckenberg., 1892, p. 37 (Nikko; Nippon; Japan).
- 1900. Bufo prætextatus Camerano, Mem. Accad. Torino, (2) L, p. 113; author's separate, p. 33, pls. t-11 (not of Boie?).

Bufo formosus is most easily distinguished from B. japonicus by its longer fore limbs, longer and slenderer digits, and much shorter webs between the toes. The alleged difference in the relative size of first and second finger, does not hold in every instance, for I have two specimens of undoubtedly the same species, from Gensan, Korea, in which the relation is reversed, but as a rule it may be said that in B. formosus the first finger is shorter than the second, while in B. japonicus it is equal to or longer than the second. In B. formosus, moreover, the interorbital space appears to be proportionally narrower.

aBufo sachalinensis is not given a place in this key, as the characters utilized in the latter are not indicated in the only description of this form thus far published.

^b Signifying Handsome.

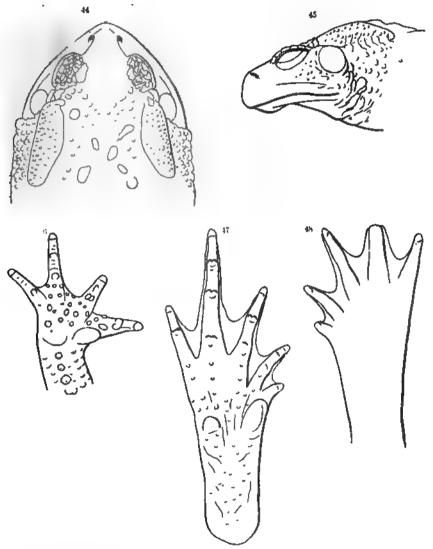
Reproduced in this work on Plate VIII.



BUFO FORMOSUS (FROM BOULENGER.)
FOR EXPLANATION OF PLATE SEE FAGE 554.



Description (figs. 44-48).—Adult male; U.S.N.M. No. 23540; Yokohama; September, 1896; L. Stejneger, collector. Snout somewhat pointed, rising steeply from the labial edge, the canthus rostralis fairly well marked and the loreal region slightly concave; nostrils about halfway between eyes and tip of snout, their distance from each



Figs. 44-48. —Bufo formosus. Nat. size. 44 top of head, 45 side of head, 46 underside of hand, 47, underside of foot; 48, upper side of foot to show extent of web. No. 2350. US N M

other greater than their distance from the eyes, but less than their distance from the labial edge or than the upper cyclids, and only two-thirds the width of the interorbital space; interorbital space very slightly concave, considerably wider than the upper cyclid; tym-

List of specimens of Bu	fo formosus	Continued.
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Museum.	No.	Sex.	Locality.	When collected.	By whom collected.	Diam ter of ty a. panum.	Unstance of tympanum from eye.
			,		,	m m .	mm.
U.S.N. M	34318	Male	Mount Fuji	Aug., 1898	A. Owston	8, 5	4
Do	34319	do	do	.'do	do	8.5	3
Do	34320	do	do	do	do	9. 5	3.5
Do	34321	Female	do	do	do	8	4
Do	34322	Male	do	do	do	8	3
Do	34323	do	do	do	do	10	3
Do	34324	Female	' do	do	do	7. 5	2. 5
Do	34325		•		do		3.5
Do	34326	Male	do	do	do	9	3
Do	34327	Female	do	do	do	8	3. 5
Do	34328	do	do	do	do	6	3
Brit. Mus 8		1			Challenger Exped.		
Do8					do		
Do8					J. Anderson		

a Types.

BUFO SMITHI, a new species.

Diagnosis.—Like Bufo formosus, but with much smaller tympanum, its diameter about equaling its distance from the eye.

Habitat.—Shikoku Island, Japan.

Type.—U.S.N.M. No. 31951; Kochi, Province of Toza, Shikoku Island; May 11, 1903; Dr. Hugh M. Smith, collector.

Remarks.—This form is so closely allied to Bufo formosus that no further description is necessary, the only difference which I have been able to detect being the smaller tympanum which is situated farther away from the eye than in that species. For the sake of completeness a set of measurements of the type is added.

Dimensions.

Male adult; No. 31951 U.S.N.M.; Kochi, Toza, Shikoku; May 41, 1903; H. M. Smith, collector.

	mm.
Tip of snout to vent	. 110
Tip of snout to anterior border of tympanum	. 28
Nostril to tympanum	. 21
Internaral width	. 7
Interorbital width	9, 5
Diameter of tympanum	. 6
Distance of tympanum from eye	; ;
Width of head	13
Fore leg	71

a Named after Dr. Hugh M. Smith, United States Deputy Fish Commissioner, who collected the type.

	mm.
Hind leg from vent to tip of longest toe	154
Tibia	
Hind foot from base of inner metatarsal tubercle to tip of longest toe	54
Length of parotoid	25
Width of parotoid	

Habitat.—The only definite locality whence we have specimens of this form is Kochi, in the island of Shikoku, where Dr. Hugh M. Smith collected a fine series of specimens in the spring of 1903.

List of specimens of Bufo smithi.

U. S. N. M. Nos.	Sex.	Locality.	When collected.	By whom collected.	Diameter of tympanum.	Distance of tympanum from eye.
					mm.	mm.
31851	Male	Suzaki, Toza, Shikoku	May 8,1903	Dr. H. M. Smith	3.5	3.5
31929	Young	Kochi, Toza, Shikoku	May 11,1903	do	2	2
31942	Female	do	May 7,1903	do	5. 5	5.5
31943	do	do	May 11,1903	do	5	4
31944	Male	do	do	do	5. 5	5.5
31945	Young	do	do	do	3.5	3.5
31946	do	do	do	do	2.5	2.5
31947	do	do	do	do	2.5	2. 5
31948	do	do	do	do	2	2
31949	do	do	do	do	2	2
31950	Female	do	do	do	6	6
31951	Male o	do	do	do	6	6

a Type.

BUFO SACHALINENSISa (Nikolski).

1905. Bufo vulg[a]ris var. sachalinensis Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, No. 1, p. 389 (type-locality, Sakhalin; types, St. Petersburg Mus., Nos. 1934–1936; Doctor Suprunenko, collector).

Not having seen any specimens referable to this form, I append a translation of Nikolski's original diagnosis:

Longitudinal diameter of eye contained one and one-half times in length of snout; width of upper eyelid one and three-fourths to two times in interorbital space; fore-head smooth (not warty); tympanum very distinct, its diameter equaling two-thirds to three-fourths the longitudinal diameter of the eye; internal metatarsal tubercle very large, its length equaling or exceeding the longitudinal diameter of the eye; a black line always marking the outer margin of the parotoids, as in *B. japonica* Schlegel.

This diagnosis, based upon six specimens, is too brief and does not allude to the crucial characters of the webbing of the toes and to the distance of the tympanum from the eye. Comparing it, however, with specimens of the next species from Korea and with B. formosus it almost looks as if the Sakhalin toad may belong to the latter rather

a From the island of Sakhalin, or Krafto, in the Okhotsk Sea.

than to the former. This, from a zoogeographical standpoint, is rather unexpected, and a comparison of specimens from central Hondo, Yezo, and Sakhalin should be highly instructive.

Habitat.—Described from, and thus far recorded only from, the island of Sakhalin, where it was collected by Doctor Suprunenko in 1890.

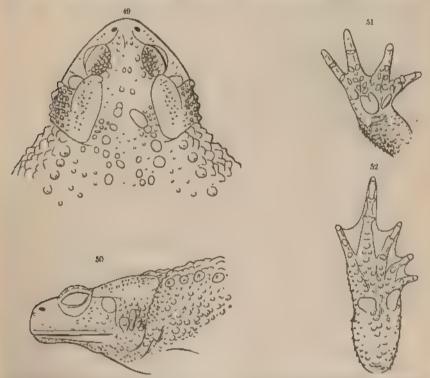
BUFO BUFOa ASIATICUS b (Steindachner).

- * 1869. Bufo vulgaris var. asiatica Steindachner, Novara Exped., Zool., I, Amph., p. 39 (Shanghai; Vienna Mus.; Zelebor and Frauenfeld, collectors).
 - 1880. Bufo vulgaris japonicus Lataste, Bull. Soc. Zool. France, V, 1880, p. 506 (Peking, China; de Plancy, collector) (not of Schlegel).
 - 1880. Bufo vulgaris Boulenger, Proc. Zool. Soc. London, 1880, p. 569 (part, Peking); Ann. Mag. Nat. Hist. (6), V, Feb., 1890, p. 141 (Khabarovka, Ussuri; Korea); Taill. Batr. Europe, Pt. 2, 1898, pp. 213, 347 (part: Khabarovka; Seoul, Chemulpo, Gensan, Korea; Chefoo, Shanghai, China).—Boettger, Ber. Senckenberg. Naturf. Ges., 1894, p. 145 (Shanghai).—Werner, Abh. Bayer. Akad. Wiss. (Muenchen), II Klasse, XXII, Pt. 2, 1904, p. 358 (Tsingtau, Shanghai).—Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, No. 1, 1905, p. 387 (part: Amur. Ussuri, etc.).
 - 1892. Bufo vulgaris var. japonica Boettger, Kat. Batr. Mus. Senckenberg., p. 37 (part: Shanghai).
 - 1899. Bufo japonicus Stone, Proc. Phila. Acad., 1899, p. 183 (Tore River, Eastern Mongolia).

Description (figs. 49-52).—Adult male; U.S.N.M. No. 17516; Gensan, Korea; July, 1886; P. L. Jouy, collector. Head wide, snout rather rounded with well-marked canthal angle, loreal region scarcely concave; nostrils slightly nearer the eye than the tip of the snout, their distance from each other greater than their distance from the eye, equaling that from the labial edge and the upper eyelid, and somewhat greater than one-half the width of the interorbital space, which is rather concave; tympanum very distinct, nearly circular, about one-half the diameter of the eye, its distance from the latter nearly equaling its own diameter, and its distance from the labial border twice its diamter; parotoid glands large, their width more than one-half the length; fore legs long; fingers free at base, third longest, second shortest, slightly shorter than first and fourth, which are equal; two very distinct palmar tubercles, the outer more than twice as large as the inner, the latter with nuptial asperities; similar but larger pads on upper and inner side of first and second fingers, and a narrow band on inner side of third; heels not meeting when folded hind legs are placed perpendicular to the axis of the body; toes nearly fully webbed, the web extending as far as the end of the two basal phalanges of the third toe and the first basal phalanx of the fourth, but slightly excised; inner metatarsal tubercle moderate, with prominent cutting edge, considerably shorter than first toe; outer metatarsal tubercle

a Rana bufo Linnæus, Syst. Nat., 10 ed., 1758, I, p. 210. b Signifying Asiatic.

slightly smaller, less prominent; no tarsal fold; double subarticular tubercles under all the fingers and under third and fourth toes; upper surface covered with numerous rounded tubercles of various sizes, which show a tendency to a symmetrical arrangement, one longitudinal series extending obliquely backward from the parotoid, while on the back between the parotoids there is a chevron-shaped figure pointing forward and a similar one on the lower back; the tubercles, many of which are larger than the tympanum, are surmounted by a conical brown point, becoming spiny on lower back and upper surface of legs; underside strongly granular or tubercular, with similar,



Figs. 49-52. Bufo bufo asiaticus. Nat size. 49 top of head, 50, side of head, 51, underside. of hand, 52, underside of foot. No. 17517, U.S.N.M.

though less developed, pointed asperities. Color (in alcohol) above pale grayish olive, with some ill-defined longitudinal vermiculating markings of an olive-buff color on both sides of back; a light band similarly colored from parotoids obliquely backward to groin and upper surface of limbs, with cross bands of the same tint; a dark slate-colored band from posterior angle of eye curving down over anterior lower portion of parotoid to insertion of arm, and a similarly colored spot on the posterior outer aspect of the gland, continuing backward below the lateral pale band and fading gradually into the

general grayish olive; tubercles on upper surface topped with umber brown, and the upper surface of the parotoids vermiculated with the same color; underside uniform, unspotted pale ochre yellow, palmar and metatarsal tubercles, as well as nuptial pads, brown; edge of upper lip and lower edge of mandible slightly tinged with the same brown color, but no dusky line on the lower jaw.

Dimensions.

	mm.
Tip of snout to vent	84
Tip of snout to anterior border of tympanum	19
Nostril to tympanum	
Internaral width	4
Interorbital width	7
Diameter of tympanum	3
Distance of tympanum from eye	
Width of head	
Fore leg	52
Hind leg from vent to tip of longest toe	110
Tibia	30
Hind foot from base of inner metatarsal tubercle to tip of longest toe	39
Length of parotoid	
Width of parotoid	

The adult female (U.S.N.M. No. 17517; same locality, date, and collector) (figs. 49-52) is larger; total length from snout to vent, 96 mm.; differs otherwise from the male chiefly in the somewhat shorter legs and in the tubercles of the skin being more pointed and more extensively pigmented, even on the underside all the tubercles being tipped with brown; that she lacks the nuptial excrescences on the fingers is a matter of course.

Another adult female (U.S.N.M. No. 21214; Seoul, Korea; P. L. Jouy, collector) is darker, the ground color above being brownish, and the pale markings clay color; the lower edge of the parotoids involved in a narrow black band, which continues for some distance backwards on the side, and a crescent-shaped branch descending from the middle of the parotoid to in front of the insertion of the arm; on the sides of the belly there are a number of small, black, isolated spots, none as large as the tympanum.

A young specimen, 41 mm. long, also from Korea (Chemulpo; Jouy, collector; U.S.N.M. No. 21215) is uniformly pinkish brown above and unspotted below, except a few blackish specks on throat and chest; there is a dusky bar descending from the eye to the edge of the lip and some indication of dusky markings on the upper lip and below the nostrils.

Habitat. -The northeastern continental representative of the European common toad (Bufo bufo) is found in eastern Mongolia, Manchuria, Amurland at least as far north as Khabarovka, Korea, northeastern China from Peking and Chefu to Shanghai, beyond which is found the southeastern representative of the European Mongolia, Manchuria, Amurland at least as far north as Khabarovka, Korea, northeastern China from Peking and Chefu to Shanghai, beyond which is found the southeastern representative of the European Mongolia, Manchuria, Amurland at least as far north as Khabarovka, Korea, northeastern China from Peking and Chefu to Shanghai, beyond which is found the southeastern representative of the European Mongolia, Manchuria, Amurland at least as far north as Khabarovka, Korea, northeastern China from Peking and Chefu to Shanghai, beyond which is

In Korea it has been found at Gensan, as well as at Chemulpo and Seoul. From Fusan we have thus far no records.

T . 4 C	•	•	T) /	• . •
List of	*pecimens	0[Bujo	asialicus.

U. S. N. M. Sex and age. No.		Locality.	When collected.	By whom collected.
17516	•	Gensan, Korea	• '	P. L. Jouy.
1214	do.¢	Seoul, Korea.		
1215	Young c	Chemulpo, Korea	Aug., 1883	Do.

a Description, p. 66.

b P. 68; figs. 49-52.

c P. 68.

BUFO BUFO JAPONICUS a (Schlegel).

- 1826. ?Bufo praetextatus Boie, Ișis, 1826, p. 215; Bijdr. Natuurk. Wetensch., II, Pt. 1, 1827, p. 271 ("Nangasacki;" Blomhoff, collector).
- 1838. Bufo vulgaris japonicus Schlegel, Fauna Japon., Rept., pp. 106, 139 (typelocality, Japan; types in Mus. Leiden; Buerger and von Siebold, collectors; part).—Guenther, Cat. Batr. Sal. Brit. Mus., 1858, p. 56 (Japan).—Martens, Preuss. Exped. Ost-Asien, Zool., I, 1866, p. 109.
- 1858. Bufo vulgaris Bleeker, Natuurk. Tijdschr. Nederland Indië, XVI, p. 205 (Japan) (not of Laurenti).—Martens, Preuss. Exped. Ost-Asien, Zool., I, 1876, p. 384 (Nagasaki).—Boulenger, Proc. Zool. Soc. London, 1880, p. 569 (part: Japan); Cat. Batr. Sal. Brit. Mus., 1882, p. 303 (part: Japan); Taill. Batr. Europe, Pt. 2, 1898, pp. 213, 347 (Kobe).—Okada, Cat. Vert. Jap., 1891, p. 66 (Japan).—?Fritze, Mitth. Deutsch. Gesell. Ost-Asiens, V, 1891, p. 239 (Yezo).

In structural characters and general proportions this island form is apparently identical with the foregoing and needs no special detailed description. Its status has been discussed above, and it was there pointed out that the only appreciable difference from the continental form is one of coloration, inasmuch as the Japanese form has the underside more or less strongly blotched and coarsely mottled with blackish, with a blackish line along the whole lower jaw, as in *Bufo formosus*.

Habitat.—The exact distribution of this form in Japan is highly problematical at the present time. Specimens from Kobe and Nagasaki seem to belong to it, but beyond this statement all is conjecture.

The occurrence of a toad in Yezo is reported by Doctor Fritze, and Doctor Nozawa writes me that he believes the toad is found in the southern part of this island, but it is impossible to say to what form it may belong. A comparison of Yezo and Sakhalin specimens would be highly interesting and instructive.

List of specimens of Bufo japonicus.

Museum.	No.	Age.	Locality.	When collected.	By whom collected.
Sci. Coll. Tokyo	74	Adult	Miyakoshima (?)		

BUFO RADDEIa Strauch.

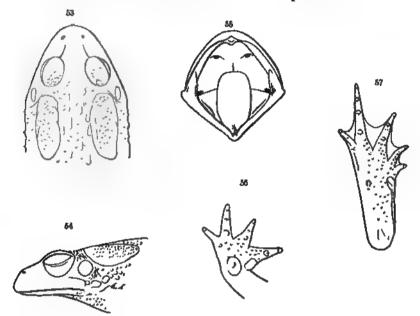
- 1859. ? Bufo variabilis var. amurensis MAACK, Putesh. na Amur (p. 153) (Amurland).
- 1859. Bufo calamita MAACK, Putesh. na Amur, (p. 153) (Amur Valley), (not of Laurenti).
- 1876. Bufo raddei Strauch in Przewalski's Mongoliya i Strana Tungutov, II, Pt. 3, p. 53 (Chinese province of Ordos, and Alashan Desert).—Lataste, Rev. Intern. Sci. (Paris), I, 1878 (p. 437); Bull. Soc. Zool. France, V, 1880, p. 69 (Peking; Chefu).—Boulenger, Proc. Zool. Soc. London, 1880, p. 551 (Chefu; Amur).—Przewalski, Reisen in Tibet, 1884 (pp. 254, 257) (Gobi Desert, eastern part).—Boettger, Offenbach. Ver. Naturk. 24–25 Ber., 1885, p. 163.—Mueller, Verh. Naturf. Ges. Basel, VIII, Pt. 2, 1887, p. 258 (Khabarovka).—Stone, Proc. Phila. Acad., 1899, p. 183 (east. Mongolia).—Bedriaga, Przewalski Reise, Zool., III, Pt. 1, 1899 (p. 42, pl. 1, figs. 1, 1a, 6).—Méhely, Zichy's Dritte Asiat. Forschungsr., II, 1901, p. 67 (North China between Daba and Khalgan; Peking).—Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg, (8) XVII, No. 1, 1905, p. 372 (Eastern Siberia, Tibet, Ordos, Amur province, etc.).

1882. Bufo raddii Boulenger, Cat. Batr. Sal. Brit. Mus., p. 294 (Sungatchi; Chefu); Ann. Mag. Nat. Hist. (6), V, Feb. 1890, p. 141 (Valley of the Amur; Dauria; Peking; Chefu).—Werner, Abh. Bayer. Akad. Wiss., (Muenchen) II Kl., XXII, Pt. 2, 1904, p. 359 (Tsingtau, China).

Description.—Adult male; U.S.N.M. No. 21394; Zagan Olui, Eastern Siberia (figs. 53-57).—Snout rounded, with indistinct canthus rostralis; loreal region but very slightly concave; nostrils nearly equidistant between eyes and tip of snout, their distance from each other slightly less than the width of the interorbital space; upper eyelid slightly wider than interorbital space; tympanum distinct, circular, its diameter about one-half that of the eye, distant from the eye about two-thirds its diameter; parotoid glands large, flat, of somewhat irregular outline, about twice as long as broad; fingers rather short, first and second subequal, fourth very short, not extending beyond the distal end of the basal phalanx of the third; two large palmar tubercles, the outer one especially very large and with a conspicuous central prominence; inner palmar tubercle as well as the first, second, and third fingers with pads of dark brown nuptial asperities; subarticular tubercles single, except one under first finger, which is semidivided; hind legs rather short; heels scarcely meeting when folded legs are placed at right angles to axis of body; toes about half webbed; subarticular tubercles single; inner metatarsal tubercle very prominent, much shorter than its distance from tip of first toe; outer metatarsal tubercle small but very distinct, prominent; a sharp cutaneous fold along the inner side of the tarsus from the inner metatarsal tubercle to the heel; a long prominent oval gland covering nearly the whole upper

a For Dr. Gustav Ferdinand Richard Radde, late director of the museum in Tiflis, who in 1855-60 explored southeastern Siberia. Born in Dantzig, November 27, 1831; died in Tiflis, March 15, 1903.

aspect of the tibia; skin coarsely granular above and below with numerous irregular glands of varying size on the back, those on either side of the median line and on the sides being rather elongate; an interior gular sac with one large opening on each side of the rather narrow tongue. Color (in alcohol) above brown with a paler median stripe; upper surface of legs with large dusky spots having narrow whitish margins; upper tip with a whitish line continued backwards to the glands back of the corner of the mouth; a conspicuous, sharply defined, longitudinal, oval blackish spot on the underside of the forearm: underside uniform pale.



Figs. 53-57.—Bupo raddel. $1\frac{1}{4} \times$ nat. size. 53, top of head; 54, side of head; 55, open mouth; 56, underside of foot. No. 21304, U.S.N.M.

Dimensions.

	more.
Tip of snout to vent	55
Tip of snout to anterior border of tympanum	14
Nostril to tympanum	11
Internaral width	3. 5
Interorbital width	4
Diameter of tympanum	3
Distance of tympanum from eye	
Width of head	
Fore leg	32
Hind leg from vent to tip of longest toe	
Tibia	
Hind foot from base of inner metatarsal tubercle to tip of longest toe	22
Length of parotoid.	
Width of parotoid	6

A young specimen, 27 mm. long, from Lake Khanka, Ussuri (U.S.N.M. No. 14343) also received from the St. Petersburg Academy, has the interorbital space much narrower, scarcely more than two-thirds the width of the upper eyelid, and the tympanum is much smaller, its diameter scarcely more than one-third the diameter of the eye. The color is very bright and the pattern very distinct; a brown line runs from nostril over canthus rostralis and the extreme outer edge of the uppper eyelid, bordered above by a pale olive line which on the tip of the snout joins a similar one occupying the entire median line of head and body above; a similarly pale line crosses the middle of the eyelids, and another one the occiput from tympanum to tympanum; parotoids pale olive with an irregular brownish figure in the outer posterior portion; all the larger glands on the back pale olive with a few dusky spots on the belly.

The females lack the subgular sac and the nuptial asperities on the fingers. These excrescences persist in the male some time after the end of the breeding season.

Habitat.—This species which seems to occur from the eastern part of the desert Gobi, Alashan, and Ordos in Mongolia to Peking and Chefu in the south and north to Dauria, the valley of the Amur and the Ussuri country, is regarded by Boulenger as representing the European Bufo calamita in eastern Asia, and as a form intermediate between the latter and Bufo viridis. In the Hamburg Museum there is a specimen collected by Dieckmann in 1894 at Khabarovka, Amurland, and another from the same locality is in the Basel Museum. Stone has recorded it from a lake near Lama-mio and various other localities in eastern Mongolia.

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) I 8T) (ecumen.	8 <i>OI</i> -	Bulo	raddei.

U.S. N.M. No.	Sex and age.	Locality.	When collicated.	By whom collected or from whom received.
14343 21394	Young a Male b	Lake Khanka, UssuriZagan, East Siberia		Acad. Sci. St. Petersburg. Do.

a P. 72.

b Description, p. 70; figs. 53-57.

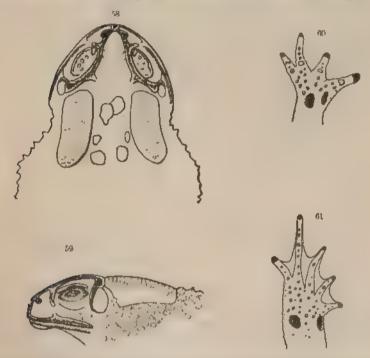
BUFO MELANOSTICTUS a Schneider.

Boulenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 306 (South China; East Indies); Fauna Brit. India, Rept., 1890, p. 505, fig. p. 506.—Boettger, Offenbach. Ver. Naturk. 24–25 Ber., 1885, p. 131 (Canton; Prov. Quangtung, China).—Flower, Proc. Zool. Soc. London, 1896, p. 911, pl. xiiv, fig. 3 (tadpole).—Steineger, Journ. Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 216 (meranostictus err. typ.) (Taipa and Giilan, Formosa.)

^a From μέλας, black; στικτός, spotted.

The numerous synonyms based upon Indian and Malayan specimens are omitted here.

Description (figs. 58-61).—Adult female; U.S.N.M. No. 36498; Sic. Coll. Mus., Tokyo, No. 26a; Taipa, Formosa; September, 1896; Tsunasuke Tada, collector. Head with strongly developed bony crests, involving the upper lip, a rostral ridge on end of snout from lip to between nostrils, there bifurcating and continuing on canthus rostralis, along supraorbital border to above the tympanum, forming there a knob-like prominence and sending a branch downward along the anterior border of the tympanum; a slight parietal spur indicated, also a short anteorbital spur or crest; nostrils nearer the tip of the



Figs. 58-61 — Bufo melanostictus Nat size 58, top of head, 59 side of head, 60, underside of hand, 61 underside of foot No 36408, U.S.N.M.

snout than the eye; interorbital space deeply concave, much wider than upper eyelid, which is strongly tubercular and with thickened glandular edges; tympanum vertical, oval or almost pear-shaped, separated from the orbit by a very narrow space, its longest diameter about three-fourths the diameter of the eye; parotoids large, swollen, kidney-shaped; first finger reaches considerably beyond second which does not quite reach as far as fourth, an elongate inner and a much larger outer palmar tubercle; subarticular tubercles single, prominent; palm, underside, and edges of fingers with numerous pointed tubercles, which, like all the other digital tubercles and the

horny tip of the fingers, are blackish brown; heels just meeting when hind legs are placed at right angles to axis of body; metatarsal tubercles reaching posterior corner of eye when hind legs are placed forward along the sides of the body; toes less than one-half webbed, the webs being greatly excised and their edges sharply denticulate; inner metatarsal tubercle prominent, oval, shorter than first toe, outer one large, rounded, less prominent; the single subarticular tubercles, plantar tubercular asperities, and tip of toes like those on the fore foot; skin strongly tubercular, the tubercles on the back larger, more distant, glandular, rounded, those on sides and limbs more prominent, almost conical, all with a horny dark-brown tip, which on sides and limbs becomes spinous. Color (in alcohol), clay-colored above, more pure pale ocher-yellow underneath, all the crests and nearly all the tips of the tubercles dark brown, as are also the elevated fine vermiculations on the surface of the parotoids; indistinct dusky spots and coarse vermiculations on limbs, sides, throat, and breast.

Dimensions.

	774 TTL .
Tip of snout to vent	84
Tip of snout to anterior border of tympanum	20
Nostril to tympanum	16
Internaral width	5
Interorbital width	8. 5
Longest diameter of tympanum	5. 8
Width of head	31
Fore leg	50
Hind leg from vent to tip of longest toe	99
Tibia	26
Hind foot from base of inner metatarsal tubercle to tip of longest toe.	30
Length of parotoid	20
Width of parotoid	8

The adult male appears to be smaller, U.S.N.M. No. 36499, measuring only 61 mm. from snout to vent, but in proportions and otherwise similar to the female, except that the webs between the toes are considerably smaller, and the outer metatarsal tubercle is smaller than the inner. It has also distinct traces of nuptial asperities on top of the first finger, probably only remnants from the breeding season, during which such excrescences are present on first and second fingers. A small internal subgular sac, entrance slits to which are seen on each side of the tongue. The dark color markings are somewhat more distinct.

A halfgrown specimen (Sci. Coll. No. 26e) measuring 46 mm. is very similar, but the skin is much less rough except on hands and feet; the interorbital space is flat, but all the cranial crests are plainly developed except the preauricular; the tips of the fingers are pale, and the dusky brown spots and vermiculations on throat, chest, and anterior portion of abdomen very strong and well defined; lips similarly blotched with dark brown.

Habitat.—Widely distributed through India, Ceylon, Burma, the Malayan peninsula and archipelago to southern China and Formosa. Boulenger states that in the Sikhim Himalayas it ascends to about 10,000 feet and in the Nilgiris to 7,000 feet.

In Formosa it seems to be common, as Mr. Tada collected many specimens at Taipa and Girlan during September and October, 1896. There are two specimens in the British Museum from Taiwan fu, collected by Holst.

List of specimens of Bufo melanostictus.

Museum	No	Sex and age	Locality When collected		By whom collect- ed or from whom received	
Bel. Coll Tokyo	281	Male	Taipa, Formosa	Sept , 1896	T Tada	
Do	2 vi	Female	do	do	Do.	
Do	264	Halfgr a	ob,	do	Do.	
Do	25a		Gillan, Formosa	Oct , 1896	Do.	
Do	258		do	do	Do.	
Do	25c		do	, do	Do.	
Do	25d		do .	. do	Do.	
USNM	34329		Taipa, Formosa.	Mar 1903	A Owston	
Da	36496	Females	do	Sept 1896	T Tada	
Do.	3/1499	Muleo	, do	do	Do.	
Do.	36500	-	Ginan, Formosa	Oct , 1806	Do.	

[«]Description, p. 74.

Family HYLIDÆ.

The tree-toads are characterized by the presence of teeth in the upper jaw, or in both upper and lower jaws, combined with an arciferous shoulder-girdle and dilated sacral lateral processes; bone of last toe-joint claw-shaped.

A large family of wide distribution, though not occurring in the Ethiopian region. The greatest number of species is found in tropical America and in Australia, but only a few in Asia and Europe. Most of the forms are arboreal with the tip of the digits enlarged into a disk, which is more or less sticky. Some are modified to such an extent for life among the trees that they lay their eggs in water collected in holes in trunks and branches of trees.

Only one genus is represented in eastern Asia.

Genus HYLA Laurenti.

1768. Hyla LAURENTI, Synops. Rept., p. 32 (type, H. viridis).
1799. Calamita Schneider, Hist. Amph., I, p. 151, comp. p. 174 (type, C. arboreus).

Description, p. 73, figs. 58-61.

a Not derived from the Greek word ἕλη, wood-land, copse, as commonly stated, but from the vocative of Hylas, in Greek mythology the favorite of Hercules, who lost him in Bithynia, the crying of hyla, hyla being part of the religious ceremonies instituted in his honor. The croaking of the tree-toad suggested to Laurenti the fanciful idea of its being Hyla's priest, and thus meriting his name, "bæc quasi Hylæ sacerdos nomei ejusdem merita est."

- 1814. Hylaria Rafinesque, Specchio Sci. (Palermo); II, fasc. 7 (substitute for Hyla).
- 1825. Boana Gray, Ann. Philos. (n. s.), X, p. 214 (type, Rana boans).
- 1826. Calamita FITZINGER, Neue Classif. Rept., p. 38 (type, Rana caerulea White).
- 1827. Rhacophorus "Kuhl" Schlegel, Isis, 1827, p. 294 (type, H. palmata; not of Tschudi, 1838).
- 1830. Calamites Wagler, Syst. Amph., p. 200 (emendation of Fitzinger's Calamita).
- 1830. Auletris Wagler, Syst. Amph., p. 201 (type, II. boans).
- 1830. Hyas Wagler, Syst. Amph., p. 201 (type, H. arborea; not of Leach, 1815).
- 1830. Scinar Wagler, Syst. Amph., p. 201 (type, II. aurata).
- 1830. Dendrohyas Wagler, Syst. Amph., p. 342 (substitute name for Hyas, pre-occupied).
- 1843. Lobipes Fitzinger, Syst. Rept., p. 80 (type, H. palmata).
- 1843. Dryophytes Fitzinger, Syst. Rept., p. 31 (type, II. versicolor).
- 1885. Epedaphus Cope, Proc. Amer. Philos. Soc., 1885, p. 383 (type, II. gratiosa).
- 1899. Hyliola Mocquard, Nouv. Arch. Mus. Paris (4), I, p. 337 (type, II. regilla).

The list of synonyms is considerably larger than the above, which includes mostly such names only as are based upon species occurring within the faunal area here treated of, or constitute corrections or additions to the synonymy as commonly given.

The tropical genus *Hyla*, as now understood, is American and Australian in its distribution, and embraces considerably over 200 species, less than 3 per cent of which occur in the Old World. The species, or forms, which are found in the mainland of Eurasia, viz, *H. annectens* and *H. simplex*, with the ones treated of in this work, constitute a closely related group ^a extending from Great Britain to Japan, south to northeastern India and Annam.

The forms which are to occupy us in this connection may be distinguished as follows:

KEY TO THE JAPANESE, KOREAN, AND FORMOSAN SPECIES OF HYLA.

- a¹ No deep black spots on sides or legs.
 - b^1 Digital disks equaling inner metatarsal tubercle.
 - c^1 A distinct blackish stripe between nostril and eye.

II. arborea japonica, p. 76

H. chinensis, p. 86

HYLA ARBOREA b JAPONICA c Guenther.

Plate IX, figs. 1-3.

1838. Hyla arborea Schlegel, Fauna Jap. Rept., pp. 112, 136, 139; Saur. et Batr., pl. III, figs. 5d, 6 (not of Linneus) (Japan).—Hilgendorf, Sitz. Ber. Berlin Ges. Naturf. Fr., 1880, no. 8, p. 120 (Hondo; Yezo).—Fritze, Mitth. Deutsch. Ges. Ost-Asiens, V, 1891, p. 239 (Yezo).

a In turn related to Hyla cximia of Mexico.

b Signifying arboreal. -Rand arborea Linneus, Syst. Nat., 10 ed., I, 1758, p. 213.

Signifying Japanese.

d Reproduced in this work on Plate IX, fig. 3.



Figs. 1-3, Hyla arborea japonica, Fig. 4, H. Chinensis. From Boulenger, Schlegel, and Guenther.

FOR EXPLANATION OF PLATE SEE PAGE 554.



- 1858. Hyla viridis var. japonica Guenther, Cat. Batr. Sal. Brit. Mus., p. 81.
- 1858. Hyla arborea var. japonica Guenther, Cat. Batr. Sal. Brit. Mus., p. 109 (type-locality, Japan; types in Brit. Mus. .- Boetrger, Offenbach. Ver. Naturk., 17-18 Ber., 1878, p. 8 Japan; Kat. Batr. Mus. Senekenberg., 1892, p. 43 (Hakone; Goto Isl.; Ber. Senekenberg, Naturf. Ges., 1894, p. 141.—Boulenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 381 Japan.; Proc. Zool. Soc. London, 1887, p. 578, pl. 11, fig. 2 Port Hamilton, Korea).—Bedriaga, Bull. Soc. Natural. Moscou n. s., 111, no. 3, 1889, pp. 475, 487 (Tokyo; Yezo). Okada, Cat. Vert. Jap., 1891, p. 66 (Tokyo).—Sclater, Batr. Ind. Mus., 1892, p. 32.
- 1860. Hyla viridis? Hallowell, Proc. Phila. Acad., 1860, p. 500 (Simoda).
- 1878. Hyla arborea var. meridionalis Boettger. Offenbach. Ver. Naturk. 17-18 Ber., p. 8 (Japan) (not of 1874).
- 1879. Hyla japonica Camerano, Atti Accad. Torino, XIV, Pt. 5, Apr. 1879, p. 895 (Tokyo).
- 1887. Hyla arborea var. savignyi Boulengen, Ann. Mag. Nat. Hist. (5), XIX, 1887, p. 67 (Gensan, Korea) (not of Audouin; Taill. Batr. Europe, Pt. 2, 1898, p. 250 (part), pl. xv. fig. 5 (Tsu-shima), fig. 6 Daibutsu (a)
- 1905. Hyla stepheni Nikolski, Zap. Imp. Akad. Nauk. S. Peterburg (8). XVII, no. 1, p. 401 (part: Yezo) (not of Boulenger?).

Schlegel's fig. 5 on Plate III b of the Saurii and Batrachii of Fauna Japonica is usually referred to Polypedates schlegelii, but I think erroneously. The webbing between the digits and the shape of the snout, as well as the coloration, indicate Hyla arborea. Moreover, an examination of the specimen in Leiden Museum shows that this view is correct.

In his catalogue of the tailless batrachians in the British Museum (1882) Boulenger recognized four varieties of Hyla arborea, of which II. arborea savignyi was credited to various islands in the Mediterranean, parts of western Asia, and to the island of Hainan. South China (a single half-grown specimen), while H. arborea japonica was represented as being confined to Japan. In 1887 (July) he recorded a specimen of the latter from Port Hamilton, a small island at the south end of Korea, opposite Kiusiu, found together with another specimen which he described as Hyla stepheni. Shortly before (January, 1887) he had referred a specimen from Gensan, Korea, to H. arborea var. savignyi, a reference, by the way, which appears to have escaped Doctor von Bedriaga. While the latter author, as well as Boettger still recognize II. arborea japonica, Boulenger in his latest important work g after the study of a large series of specimens (34 from the Mediterranean and western Asia as far as the Persian Gulf and 18 from Japan, Korea, and China)

a Reproduced in this work on Plate IX, figs. 2, 1.

b Reproduced in this work on Plate IX, fig. 3.

c Proc. Zool. Soc. London, 1887, p. 578.

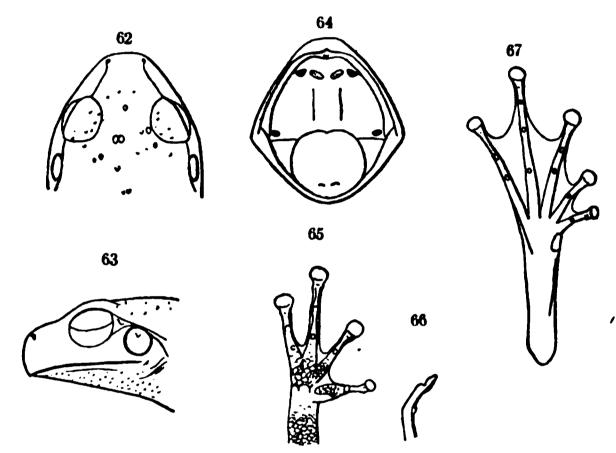
d Ann. Mag. Nat. Hist. (5), XIX, Jan. 1887, p. 67.

Buil. Soc. Nat. Moscou, (n. s.) III, 1889.

[/]Kat. Batr. Mus. Senckenb., 1892, and Ber. Senckenb. Naturf. Ges., 1894.

g Taill. Batr. Europe, II, 1897.

pronounce them all *H. arborea savignyi*. From the text (pp. 250-251) it is evident that his reason for this is that there are spotted specimens found in the western series as well as unspotted ones among those from eastern Asia. It is quite possible that the unspotted specimens may be somewhat difficult to distinguish, but in the spotted ones the angular shoulder spots of the Japanese and Korean specimens seem to be almost diagnostic. In our plain-colored specimens, moreover, I can always detect dusky bars across the tarsus, and I would also call attention to the dark spot on the upper lip under the anterior portion of the eye which is found in many of the eastern specimens. Under these circumstances I think it preferable to follow Boettger in maintaining the old status of *H. arborea japonica* as a distinguishable form.^a



Figs. 62-67.—Hyla arborea japonica. 1½ × nat. size. 62, top of head; 63, side of head; 64, open mouth; 65, underside of hand; 66, top of finger, side view; 67, underside of foot. No. 23542, U.S.N.M.

Description (figs. 62-67).—Adult female; U.S.N.M., No. 31926; Kochi, Province of Tosa, Shikoku; May 11, 1903; Dr. Hugh M. Smith, collector. Vomerine teeth in two nearly straight, short series between the choanæ; tongue large, broadly oval, somewhat truncate behind, with a slight median incision; nostrils somewhat nearer the tip of the snout than the eye, their distance from each other shorter than their distance from the labial edge, and still shorter than the inter-

a What is Hyla cyanea Hallowell, Proc. Phil. Acad., 1860, p. 494, from "Loo Choo"? All he says is: "Hyla cyanea Daudin (young). One specimen." There is great confusion in this paper of Hallowell's (for instance, Polypedates viridis and burgerii, p. 501, under Japan instead of Loo-Choo; Ophthalmidium tenue, p. 497, from Hongkong, China, under Japan), and it is quite possible that this reference to a young Hyla cyanea is only a duplication of the Australian record, p. 490: "Hyla cyanea Daud. One specimen. Sidney (young). Taken Dec., 1853," which got misplaced. I may add that Boulenger refers it with a query to Rhacophorus viridis (Proc. Zool. Soc. London, 1887, p. 149).

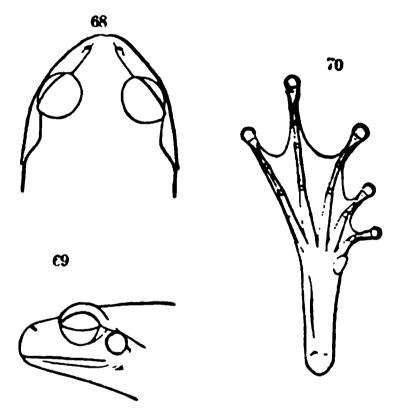
orbital width, which is considerably greater than the upper eyelid; tympanum nearly circular, its diameter about one-half that of the eve, its distance from the latter greater than from the corner of mouth: fingers distinctly webbed at base, first shortest, fourth longer than second, third longest; disks of fingers slightly larger than those of toes, nearly as large as tympanum; hind feet rather long, tarso-metatarsal joint reaching considerably beyond tip of snout and heel joint reaching to middle of eye when legs are carried forward along the side of the body; heels just touch when folded legs are placed vertical to the axis of the body; toes webbed slightly more than one-half; third toe as long as fifth; inner metatarsal tubercle oval, prominent, about the size of the disk of the longest toe; no outer metatarsal tubercle; subarticular tubercles under fingers and toes prominent; skin above smooth; below granular, except on inner side of tibia; a strong glandular fold from eye, curving downward behind the tympanum to the insertion of the fore leg; a strong dermal fold across the chest from axilla to axilla. Color (in alcohol) about smoke gray (in life bright green), with dusky markings as follows. A Y-shaped rostral stripe on the end of the snout, connected below with an undulating blackish line, forming the edge of the upper jaw, the diverging upper branches reaching the nostrils and continuing behind these through the eye and over the tympanum as a dark stripe, edged above with whitish; on the tympanum it widens so as to embrace the whole of this organ, and continues backward over the shoulder along the flanks as an irregular broad band, which in the groin is replaced by coarse vermiculation of blackish and white; a dusky spot between lower anterior portion of eye to edge of lip, a pair of dusky spots, one on each upper eyelid, converging, though not meeting, backward; a large angular, L-shaped mark on each shoulder, and a smaller, more irregular spot on each side of the lower back, descending toward the groin, but not connected with the dusky band of the flanks; on the coccyx several smaller irregular blotches; a spot in front of the upper end of humerus, a narrow dusky line along the posterior outline of the arm; posterior aspect of femur brownish gray with distinct rounded white spots; upper aspect of fore leg and hand legs, including tarsus, with distinct dusky crossbars; lower hp whitish, with a series of dark spots; underside whitish, with numerous small dusky spots on throat.

Dimensions	
	mm.
Tip of snout to vent .	37
Typ of shout to anterior border of tympanum .	9, 5
Nostril to anterior border of tympanum .	8
Internaral width	3
Interorbital width	4
Diameter of tympanum	2

•	异两.
Width of head	12
Fore leg	23
Hind leg from vent to tip of longest toe	57
Tibia	
Foot from base of inner metatarsal tubercle to tip of longest toe	18
Inner metatarsal tubercle	2

The adult male has a large external, dark-pigmented, vocal sac under the throat, folding up with longitudinal folds when not inflated. The males of U.S.N.M. No. 7428, which were collected by Dr. Wm. Stimpson, at Simoda, in May, 1855, consequently during the breeding season, have a large and distinct pad of nuptial asperities on the upper side of the base of the first finger, but they are not distinguished from the adjacent skin by any different coloration. The color of these specimens, which have the back unspotted, is described from life by Stimpson as being "bright light green above; a golden band along each side of the head, including the eye; sides minutely sprinkled with copper color; belly white."

Variation.—In the series before me the structural and proportional



FIGS. 68-70.—HYLA ARBOREA JAPONICA. 1] X NAT. SIZE. 68, TOP OF HEAD; 69, SIDE OF HEAD; 70, UNDERSIDE OF FOOT. No. 21211, U.S.N.M.

characters, such as the size and shape of the vomerine series of teeth, the size of tympanum, digital disks, and metatarsal tubercle, vary within certain limits. The length of the foot is found to vary considerably in a few specimens, apparently without being correlated with any other difference. It is in the coloration, however, that we meet with the greatest amount of variation. only are many of the specimens entirely uniform above, but the lateral stripe is scarcely indicated in a large number, and the mark on the tip of the snout is absent in most.

The dusky spot beneath the eye is present in a majority, and the crossbars on the tarsus are visible in all the specimens which are not so faded from age as to have lost nearly all trace of markings. In the specimens with dorsal spots the angular shoulder mark is usually present, but in No. 23542, at least, there is a longitudinal stripe on each side of the back, caused by a fusion of the two dorsal spots and the obliteration of the transverse branch of the anterior mark.

Habitat.—The tree-toad, a name probably preferable to that of tree-frog, which may properly be restricted to the genus Polypedates (or Rhacophorus of many authors), occurs all over Japan proper in suitable stations. It is hardly necessary to enumerate specific locali-

ties, though the following are represented by specimens in various museums: In Kiusiu Yamagawa and Miyazaki (U.S.N.M.), Mount Onsen in Shimabara (Brit. Mus.); in Shikoku: Kochi (U.S.N.M.); in Hondo: Nara, Koriyama, Simoda, Mount Fuji, and Yokohama (U.S.N.M.), Kobe, Kiga, Daibutsu (Brit. Mus.), Setsu (Hamburg Mus.), Hakone (Senckenberg Mus.): in Yezo: Hakodate and Sapporo (U.S.N.M.). There are also in British Museum specimens from Tsu-shima collected by Holst, and in Museum Senckenbergianum one specimen from Goto Island, near Nagasaki

There is no record of the species in any of the Riu Kiu Islands or Formosa.

Outside of Japan it occurs in Korea, whence specimens are in the United States National Museum (Fusan) and in the British Museum (Gensan and Seoul); the Hamburg Museum also has specimens from southern Korea, collected by Doctor Warburg. One specimen was brought from Port Hamilton by Mr. G. Stephen, together with the type of Hyla stepheni.

The status of the Chinese specimens which have been referred to this form is too uncertain to detain us here. It may be sufficient to refer to what is said under the heading of Hyla arborea immaculata, with the additional remark that the Hainan specimen belongs to the recently described Hyla simplex as suggested by Doctor Boettger.

List of specemens of Hyla arborea japonica

U S N M No	Sex and age	Locality	When		By whom collected or from whom re- ceived
74290	Malex	Simoda, Izu Hordo	May,	1855	Wm Stimpson.
74285	de	do	do		Do.
7428c	do	, do	do		10.
7428/	10	40	do		Do.
7428c	Fernale	la	do.		Do.
7492a	Yo mg	Hakodate Yezo .		1	Do.
7492h	do	lo .			Do.
11 345	dı	tupati		1878	E S. Morse.
11346	क्ष	10		1878	Do.
17501	Female	Fusan Korea .		1885	P L Jouy.
21311	416	Secul" Korea		1883	Do.
21212	Young	10		1883	Do.
23441	do	Sappore, Yezo		1896	Nozawa
23442	do	dn		1896	Do.
23443	da	10 .		1896	Do.
23444	do	10		1996	Do.
28445	45	do		1896	Do.
230 42	Female -	Yokohama Hondo	Sept.,	1896	L. Stejneger.
20568	do	10	.do		Do,
23907	j ı	Or ogams, Gurbs			1 ljima.
23805	Halfgrown	4n			Do.
а,	descript in p	so # Figs, 68-70 nee also p-85	r F	igs 62	67, see also p 85.

 $^{^{}n}\,Hgla$ chmensis var $\,sim\,ple\,(\,Boettger,\,Ber\,\,Senekenberg\,\,$ Naturf. Ges., 1901, Abh., p. 53

²⁶⁴⁸⁵ No 58-07 6

List of specimens of Hyla arborea japonica-Continued.

US. N.M No.	Sex and age.	Locality.	When col- lected.	By whom collected or from whom re- ceived.
30742	Female	Miyasaki, Iliuga, Kiusiu		C. A. Clark.
30743	Male			Do.
31803	Halfgrown			H. M. Smith.
31806	do	Koriyama, Yamato, Hondo	Apr. 28, 1903	Do.
31806	do	do	do	Do.
21807	do	`do		Do.
31825	Male	Yamagawa, Satsuma, Kiusiu	June 14, 1903	Do.
31820	Young	do	do	Do.
31827	do	`do	do	Do.
31913	Male	Kochi, Tora, Shikoku	May 11,1903	Do.
31914		.,,do.,		Do.
31945	do	do	do	Do.
31915	Male	do	do	Do.
31917	Female	do	do	Do.
31918	Male	do	do	Do.
31919	do	40	do	Do.
31920	do	do	do	Do.
31921	do	do	do	Do.
31926	Females	do	do	Do.
34374	Male	Mount Fuji, Hondo	Summer, 1896	A. Owston.
34375	do	• •		Do.
36370	Female	40	do	Do.
34377	do		do	Do.
34378	Male		do	Do.
84310	Female	., .do,,,,,	do	Do.
34380	do		l .	Do.
34381	Male		do	Do.
34382	Female	10	do	Do.
34383	do	do	do	Do.
34394	do	do	.do	Do.
34385	do		.do	Do.
34356	do	do	do	Do.
34367		- 40.	do	Do.
34300	do	do .	.ilo	Do.
34399	. do	do	do.	Do.

« Description, p. 78.

[HYLA ARBOREA IMMACULATA# Boettger.]

1888. Hyla chinensis var. immaculata Boettoer. Ber Senckenberg. Naturf. (ies., 1888, Abh., p. 189 (type-locality, Shanghat, type in Mus. Senckenberg.; Schmacker, collector) "Stone, Proc. Phila. Acad., 1899, p. 184 (Tore River, eastern Mongolia).

1892. Hyla arborea var immaculata Boettoek, Kat. Batr. Mus. Senckenberg., p. 43 (Shanghai, Lueshan Mts., near Kiukiang); Ber. Senckenberg. Naturf Ges., 1894, p. 140 (Lueshan).

This form which Boettger originally referred to Hyla chinensis as a variety he has since associated with H. arborea. According to his revised view of 1894^b it is most nearly related to H. arborea japonica,

a Signifying Unspotted. bBer. Senckenberg. Naturf. Ges., 1894, p. 141.

from which "it may be easily separated by the following characters: No web between the outer fingers; toes one-third webbed; no dark loreal stripe," while *II. arborea japonica* has "one-fourth web between third and fourth finger; toes one-half webbed, and an always distinct dark loreal stripe. In the proportion between the length of the tibia to that of the femur there may also be a slight difference. In var. *immaculata* the tibia appears to be somewhat longer than the femur; in var. *japonica*, on the contrary, the femur is longer than the tibia."

I have not seen any specimens of this form from the type locality and therefore can not express any opinion as to its validity, but if the three specimens from Mongolia, which Mr. Witmer Stone somewhat doubtfully referred to this form, really belong to it, it would appear that the characters assigned to it are somewhat unstable and unreliable.

Thanks to the kindness of the authorities of the Philadelphia Academy, I was recently permitted to examine the three specimens alluded to above, namely, Nos. 4943–4945, collected by Doctors Smith and Furness at Tore River, Mongolia.

No. 4945, which is adult, differs from a German specimen, with which I could compare it, by being entirely immaculate, with no trace of canthal or postocular streaks or dusky crossbars on the legs. The foot is somewhat shorter and the webs slightly larger, the heels do not meet by a space of 2 mm, when the folded hind legs are placed vertical to the axis of the body, and they do not reach the axilla when the leg is extended along the side of the body.

No. 4944, also adult, has relatively longer hind legs, as the heel reaches the posterior border of the eye. A canthal and postocular line can be distinctly traced, also some spots on the upper lip, and apparently faint cross markings on the legs.

No. 4943, which is quite young, is nearly unspotted like No. 4945, but with trace of a subocular spot on one side and of cross markings on legs.

The following measurements were taken of the two adults to show the difference in the relative length of the hind legs:

	No 4945.	No 4944.
	mm	mm
Smout to yent	40	39
Vent to trp of longest toe	49	59
Heel to trp of longest toe	25	27

The status of the tree-toad of northern China is consequently still doubtful. It seems to be fairly distinct from the Japanese form, however, in the *relatively* immaculate coloration.

Habitat.—Boettger originally recorded this form from Shanghai and later from the Lueshan Mountains near Kiukiang on the Yangtse-kiang, where it occurs together with Hyla chinensis. Three Mongolian specimens, from the Tore River, have been referred to this form doubtfully, as detailed above.

List of	s vecimens	of	Hyla	immaculata.
	J. Comment	~ <i>J</i>	3	

Phila. Acad. No.	Age.	Locality.	When collected.	By whom collected.
4943	_	Tore River, Mongolia	i	1
		do		Do. Do.
טפער		: .uo		D 0.

a P. 83.

HYLA STEPHENIa Boulenger.

1887. Hyla stepheni Boulenger, Proc. Zool. Soc. London, 1887, p. 579, pl. Li, fig. 1 (type-locality, Port Hamilton, Korea); Ann. Mag. Nat. Hist. (6), V, Feb. 1890, p. 142 (Ussuri River); Proc. Zool. Soc. London, 1890, p. 326.—Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, No. 1, 1905 (part: Ussuri, etc.).

This species was described by Boulenger from a specimen collected at Port Hamilton, together with a specimen of true *H. arborea japonica*. It is professedly nearly allied to *H. arborea*, and no comparison with the latter accompanies the description.

Later on (1890) he records two specimens from the Ussuri River of which he gives the measurements and says that the species "is easily distinguished from *II. arborea* by the much larger and more prominent metatarsal tubercle." The length of the inner toe is given as 4 mm. and that of the metatarsal tubercle as 2.5 mm.

Through the kindness of the authorities of the British Museum, I was able to examine these specimens during my visit in 1898.

The type (Brit. Mus. 89.11.8.5) is in very poor condition (dried up) and nothing can be made of it. The two other specimens, however, referred by Boulenger to this species (Brit. Mus. 89.12.16.197.7), collected by Doerries at the Middle Ussuri in 1886 (Fischer collection Nos. 754-5), are in very good condition and, compared with the Hondo specimens of *II. japonica* then in the British Museum, show a difference in the relative size of disks and metatarsal tubercle as follows:

In the latter, moreover, the ventral granulation is considerably finer. Whether the Ussuri specimens are identical with the Port Hamilton type is now hard to determine, but we will have to accept Boulenger's identification as correct.

a For Mr. George Stephen, R. N., who collected the type.

A single specimen in the United States National Museum (No. 21211, Figs 68-70, collected by Jouy in Korea in 1883, probably in Seoul, has a somewhat larger inner metatarsal tubercle than the other specimens from Korea and Japan, and while the snout is possibly a trifle shorter the hind legs are not short, the tibio tarsal articulation reaching the front of the eye; finally, the ventral granulation is exactly as in the typical Hyla japonica. At first I thought that the hind foot of this individual might afford a good character, it being considerably larger than in most of my Japanese specimens, but one collected by myself at Yokohama, in 1896, is so nearly like it that I do not venture to separate them.

Altogether I am not assured of the distinctness of *H. steplani*, my faith in it having been considerably shaken by the last-mentioned specimen (U.S.N.M. No. 23542, figs. 62–67). However, having been favorably impressed by the examination of the Ussuri specimens, and not now having an opportunity to reexamine them in connection with my own material, I do not feel warranted in disturbing the status given them by Boulenger.

Nikolski, in 1905, has referred the tree-toads in the St. Petersburg Museum from Yezo, collected by Albrecht in 1865 and by Maximovitch, to H. stepheni, apparently as distinct from the tree-toads of southern Japan. I have not been able to accept this view, as I have been unable to discover any tangible difference between the Hylas on both sides of Tsugaru Strait, but Nikolski's action goes to show how unsatisfactory the whole question is as yet. Much more material will be necessary before it can be settled.

There being no undoubted specimen of this form in our museum, I reproduce herewith Boulenger's original description and his measurements of the two Ussuri specimens.

Original description of type-specimen. Brit. Mus. No. 89,11.8.5; Port Hamilton, Korea; G. Stephen, collector. Near II. arborca. Tongue subcircular, slightly nicked, and free behind, vomerme teeth in two slightly oblique series between the choana; head a little larger than that of Il arborea, broader than long; snout rounded, shorter than the diameter of the orbit; canthus rostralis distinct; loreal region slightly concave; interorbital space as broad as the upper eyelid; tympanum distinct, half the diameter of the eye; fingers with a short web at the base; no projecting rudiment of pollex; toes hardly two-thirds webbed; disks a little smaller than the tympanum; subarticular tubercles moderate, inner metatarsal tubercle large and very prominent, oval, about two-thirds the length of the inner toe; a fold along the inner edge of the tarsus, the tibio-tarsal articulation reaches the tympanum; tibia not half the length of the head and body; skin smooth above; lower surfaces, throat of male included. granular. Color varying from grayish or brownish to green, with

darker, blackish-edged permanent symmetrical insuliform spots on the body and cross bands on the limbs; a dark brown streak from nostril to eye; lower parts whitish; lower belly and limbs carneous; sides of thighs carneous; iris dark bronzy brown. Male with an external subgular vocal sac.

From snout to vent 35 mm. a

Dimensions.—British Museum, No. 89.12.16.197.7; middle Ussuri; Doerries, collector.

	Male.	Female.
	78276.	38.78 .
From snout to vent	. 35	40
Length of head	. 12	13
Width of head	. 13	15
Diameter of the tympanum	. 2	3
Fore limb	. 20	23
Hind limb	. 51	57
Tibia	. 15	17
Inner toe	. 4	4
Inner metatarsal tubercle	. 25	42

a Boulenger, Ann. Mag. Nat. Hist. (6), V, Feb. 1890, p. 142.

Habitat.—The only specimens until recently recorded as belonging to this form are the ones mentioned above, one from Port Hamilton, off the south end of Korea, and two from the middle Ussuri. Hamburg Museum there are specimens from Khabarovka (No. 863) as well as from Vladivostok (No. 864), collected by Dieckmann, which are there referred to this species. Nikolski, in 1905, refers tree-toads. from as far west as Nertshinsk and the river Shilka, as well as the Yezo specimens in the St. Petersburg Museum to this species.

List of specimens of Hyla stepheni.

Brit. Mus. No.	Sex.	Locality.	When col- lected.	By whom col- lected.
	1	Port Hamilton, Korea		l .
		do		
<u></u> -	vpe. descript	ion. n. 85.	<u>'</u>	'

rybe, description, p. 85.

HYLA CHINENSIS b Guenther.

Plate IX, fig. 4.

1858. Hyla arborea var. chinensis Guenther, Cat. Batr. Sal. Brit. Mus., p. 108, pl. 1x, fig. Cc (type-locality, China; types in Brit. Mus.).

^a Boulenger, Proc. Zool. Soc., 1887, p. 579.

b Signifying Chinese.

c Reproduced in this work on Plate IX.

1864 Hyla chinensis Guenther, Rept. Brit. India, p. 436 (southern China and Formosa) —Steindachner, Novara Exped, Zool, I, Amph., 1867, p. 59 (Amoy) —Camerano, Atti Accad. Sci., Torino, XIV, Pt. 5, Apr. 1879, p. 894 (China) —Boulenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 381 (China; Formosa) —Boettger, Kat. Batr. Mus. Senckenberg., 1892, p. 43 (Dalanshan and Lueshan Mis., China), Ber. Senckenberg. Naturf. Ges., 1894, p. 141 (Lueshan Mis., near Kiukiang), p. 149 (Dalanshan and Chinhai, near-Ningpo).

This species is closely allied to *Hyla arborea*, but the vomerine teeth are more posterior. The coloration is also peculiar and easily recognizable, the color above being uniform and immaculate bright green, the sides beautifully sulphur yellow (according to Boettger), white in alcohol, with round spots of a deep black, and extensive markings of the same color on the posterior aspect of the thighs.

Habitat. This species occurs in southern and eastern China at least as far north as Shanghai, and as far west as the Tsin Ling Mountains, Shensi, whence the U. S. National Museum has specimens (Cat. nos. 19230 and 35529).

Swinhoe obtained it in Formosa and sent specimens to the British Museum, which also has a specimen from Taiwan fu, received from the Formosa Museum, and several other specimens (males, females, and young) collected by Mr. Holst in West Taiwan fu.

List of specimens of Hyla chinensus.

Museum	N+)	Age.	Locality	When col- lected	By whom collected or from whom ob- tained
U.S N.M Do. Brit Mus	19290 35529		Shanghai, China Shensi, China. Taiwan fu, Formosa	1904	Brit Mus. E Blackwelder. P Holst

Family ENGYSTOMIDÆ.

Jaws without teeth; shoulder-girdle, firmisternian and sacral lateral processes dilated. Widely distributed over the tropical portions of the globe. Most of the forms are terrestrial, some burrow in the ground, some are aquatic, but none are arboreal. Many of the species are ant-eaters.

Only one genus is represented within the area covered by this work

Genus MICROHYLA a Tschudi.

- 1838 Murchyla Tschuni, Classif Batr, pp 28, 71 (type, Hylaplesia achatina).
- 1841 Micrhyla Duméric and Bibron, Erpét. Gén , VIII, p. 613 (emendation).
- 1843. Hylaplesia Fitzinger, Syst Rept., p 31 (type, H. achatina) (not of Boie, 1827).
- 1843 Siphneus Fitzinger, Syst. Rept , p. 33 (type, Engystoma ornatum) (not of Brants, 1827)

a From use pus, small, and Hyla, the generic name of the common tree-toad.

- 1848. Dendromanes GISTEL, Naturg. Thierr., p. xI (substitute for Microhyla).
- 1858. Diplopelma Guenther, Cat. Batr. Sal. Brit. Mus., p. 50 (type, Engystoma ornatum).
- 1861. Scaptophryne Fitzinger, Sitz. Ber. Akad. Wiss. Wien, XLII (p. 146) (type, S. labyrinthica=Engystoma pulchrum).
- 1872. Ranina David, Nouv. Arch. Mus. Hist. Nat. Paris, VII, fasc. 4, Bull., p. 76 (type, R. symetrica=E. pulchrum) (not of Lamarck, 1801).

The genus *Microhyla*, though belonging to an entirely different family, agrees with *Bufo* in having no teeth, but is easily distinguishable by the smooth skin, roundish pupil, and absence of parotoid glands.

This genus embraces at least nine species peculiar to China and various parts of the East Indies, including Ceylon and some of the islands in the Malay Archipelago, such as Sumatra, Java, and Borneo. Two forms allied to the widely distributed *Microhyla ornata*, which also occurs in China, are found within our territory, namely, one in Formosa and the other in the Riukiu Archipelago.

They may be distinguished as follows:

M. okinavensis, p. 89.

MICROHYLA FISSIPES a Boulenger.

1884. Microhyla fissipes Boulenger, Ann. Mag. Nat. Hist. (5), XIII, p. 397 (typelocality, Taiwan fu, southern Formosa; type in British Museum).

The original description by Boulenger is reproduced herewith. For further notes see the remarks under *Microhyla okinavensis* further on (pp. 89-90).

Original description of type-specimen.—British Museum; Taiwan fu, south Formosa; R. Swinhoe, collector. Habit slender; snout truncate, slightly longer than the orbital diameter; interorbital space broader than the upper eyelid; fingers slender, first much shorter than second; toes long and slender, free, with a slight lateral fringe; tips of fingers and toes not swollen; subarticular tubercles distinct; two rather small, obtuse, metatarsal tubercles; the hind limb being carried forward along the body, the tibio-tarsal articulation reaches the eye; skin nearly smooth above, with small warts on the sides. Olive-brown above, the small warts tinged with red; a darker lateral band from the tip of the snout, passing through the eye down to the middle of the side; an elongate X-shaped darker marking commencing between the eyes, and another, V-shaped, on sacral region; limbs with dark crossbars. From snout to vent 26 mm. (Boulenger, Ann. Mag. Nat. Hist. (5), XIII, 1884, pp. 397–398.)

Habitat.—This species seems to be restricted to Formosa. There are three specimens in British Museum, viz, the type collected by

Swinhoe at Taiwan fu and two specimens secured by Holst in central Formosa. The United States National Museum has recently obtained a small specimen from "Daipe or Daihoku," north Formosa, through Mr. A. Owston.

List of specimens of Microhyla fissipes

Museom	No.	Sex and Locality.	When col lected	By whom collected or from whom received
U.S.N M	34469	Daipe, north Formosa	Mar , 1903	\ Owston.
Brit. Mus	(0)	Taiwan fo		R Swinboe
Ðо	94, 11, 14, 9	Central Formosa,		P Holst
Do .	94, 11, 14, 10	do		Do

4 Type description p 88.

MICROHYLA OKINAVENSISa Stejneger.

1887. Microhyla fissipes Boulenger, Proc Zool Soc London, 1887, p. 150 (not of 1884) (Riu Kiu Islands).—Okada, Cat Vert Jap., 1891, p. 66 Okinawa) Fritze Zool Jahrb Syst., VII, 1894, p. 865, author's separate, p. 16. Bortroer, Offenbach, Ver. Naturk. 33-36 Ber., 1895, p. 106 ("Ohoshima or Okinawa").

1901 Mecrohyla okinacensis Steineger, Proc. Biol. Soc. Washington, XIV, 1901, Dec. 12, p. 189 (type-locality, Okinawa shima; type, Sci. Coll. Mus. No. 25a — U.S.N.M. No. 36553)

1902 Microhyla undulata Buows Proc. Phila Acad., 1902, June 11, p. 186 (type-locality, "Loo Choo Islands;" types, Wistar Instit. Phila., Nos. 5726-8, Furness and Hiller, collectors)

I was so fortunate as to be able to compare five specimens of the present species with the type and three other Formosan specimens of M fissipes in British Museum. The former consisted of two specimens brought by Pryer's collector from the Riu Kius (Brit. Mus. 87.1. 31. 43-44), and three collected by Holst in the mountain regions of Motobu, about 30 miles north of Nafa, Okinawa shima (Brit. Mus. 92, 9 3, 24-26). The chief difference between the Formosan specimens and those from Riu Kiu consists in the presence of a distinct, though small, basal web between the toes and in the appreciably greater development of the metatarsal tubercles in the latter. Other differences which I thought that I had detected between my type-specimen and the original description of M. fissipes did not hold. Thus, the smoothness of the sides or presence of slight warts does not seem to be of any moment, and the coloration is essentially alike. The X and V shaped marks of the type, as described by Boulenger, are only due to the somewhat darker outlining anteriorly and posteriorly of the median dorsal patch; the median white dorsal stripe of the type of M. okinavensis is only shown by one of Pryer's specimens

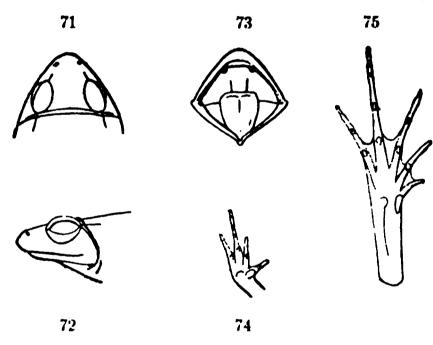
a From Okmawa shima.

How unreliable a character is furnished by the comparative length of the hind legs is shown by Holst's Riukiu specimens. In the smallest of these the tibio-tarsal joint just reaches the snout; in the medium-sized specimens it goes considerably beyond the snout, and in the largest one only to the front of the eye.

The United States National Museum has now a large series from Ishigakishima, the first record from this group. They agree distinctly with the Okinawa type and not with the Formosa specimen, which we also now possess.

Brown's Microhyla undulata is the same as the present species and is published six months later. It is stated in the original description that the toes are "half-webbed," but that is a mistake, as an examination of the types in the Wistar Institute in Philadelphia showed me. The web in these specimens, as in the others, is between the metatarsals, while only a small portion of it extends beyond the base of the toes.

Description of type.—Adult female; U.S.N.M. No. 36553. Okinawa shima; Sci. Coll. Mus. Tokyo No. 25a (figs. 71-75).—Snout



FIGS. 71-75.—MICROHYLA OKINAVENSIS. 13 × NAT. SIZE. 71, TOP OF HEAD; 72, SIDE OF HEAD; 73, OPEN MOUTH; 74, UNDERSIDE OF HAND; 75, UNDERSIDE OF FOOT. No. 36553, U.S.N.M.

rather pointed, slightly longer than diameter of orbit; interorbital space broader than upper eyelid; first finger much shorter than second; toes with a distinct though slight web at base and a mere indication of a fringe along the toes; tips of fingers and toes not widened; subarticular tubercles very distinct; metatarsal tubercles rather large, the inner measuring more than one-half the orbital diameter; the hind

limb being carried forward along the body, the tibio-tarsal joint barely reaches the eye; skin smooth above and on sides. Color (in alcohol) of a purplish gray above, with a light, very narrow median line from tip of snout to above anus; a spear-shaped dark brownish mark on occiput, from between the eyes, with the tip pointing backward and widening into two wavy dark bands which diverge toward the groins, contracting again on the sacrum, ending on the upper side of the thighs and embracing a space on the back somewhat darker than the ground color; outside of these bands and parallel with them are several faint, wavy lines of a dusky color; a dark brownish band of considerable width starts at the tip of the snout, covering the sides of face and neck, runs backward above the arm, is lost on the groin but reappears on the anterior aspect of the thigh;

the opposite edges of the dorsal and lateral dark bands are very sharply defined and emphasized by a very narrow light line; a dark band on the posterior aspect of the thighs, joining in an arch over the arms; a pale band from eye to the insertion of the fore leg; limbs with dark crossbars; underside whitish, heavily marbled with dark brownish gray on chin and throat, less so on anterior and lateral parts of belly; only a small portion of the latter posteriorly is immaculate.

Dimensions	
	771 775
Total length from snout to vent	 28
Greatest width of body	20
Width of head at posterior angle of eye	- 8
Fore lumb	13
Hind limb	43
Tibia	14

The adult male is somewhat smaller than the female, with slightly longer hind legs; throat distinctly blackish.

Variation.—The pale line down the middle of the back is often lacking and the faint wavy lines between the broad, heavy dorsal and lateral bands are often very faint or absent.

Habitat.—This species inhabits the islands between Japan and Formosa, from Okinawa shima southward, as shown by numerous specimens collected in the latter island and Ishigaki shima, of the Yaeyama subgroup.

Whether the species also occur on Miyako shima is not known.

List of specimens of Microhyla okunavensis

Museum	No.	Sex	Locality	When col- lected	By whom col- lected or from whom received
S.N M	23904		Kunshiau Okinawa		I ijima.
			shima		
Do	34472	Female	lehigaki shima	April - June,	A Owston
				1899.	
Do.	34478	do	do	do	Do
Do	34474	do	, do	do	Do.
Do	34475	do	do	do	Do.
Do	34476	do	do ,	da	Do.
Do	34477	do	do	,da	Do.
Do	34478	ďυ	do .	do	Do.
Do	34479		do	do	Do
Do	34480		do	do	Do
Do	34481	Male .	do	do	Do.
Do	34482		,40	dn.	Do
Do	34483		do	do	Do.
Do .	34484	Mule	do	do	Do.
Do	34485		do	do	Do.
Do	34486	Male.	do	do	Do.
Dn	34487	Female	do	do	Do.
Do	34488		do	ďα	Do.

Museum.	No.	Sex.	Locality.	When collected.	By whom collected or from whom received.
U.S.N.M	34489		Ishigaki shima	April - June, 1899.	A. Owston.
Do	34490		do	do	Do.
Do	344 91	Male	do	do	Do.
Do	36553	Female 4	Okinawa shima		Sci. Coll.
Sci. Coll. Tokyo	(I) P.3	! 	Shuri, Okinawa shima	 	Shiraishi.
Brit. Mus	87. 1. 31. 43		Riu Kiu		J. S. Pryer.
	87. 1. 31. 44		do		Do.
Do	92. 9. 3. 24		Motobu, Okinawa shima.	 	P. Holst.
Do	92. 9. 3. 25		do		Do.
Do	92. 9. 3. 26		do		Do.
Wistar Inst	5726	(b)	Riu Kiu	l <u> </u>	Furness and Hil-
	! }	I	·	į	ler.
	5727	(b)	do		Do.
	5728	(6)	dodo		Do.

List of specimens of Microhyla okinavensis—Continued.

Family RANIDÆ.

The frogs proper are characterized by teeth in the upper jaw combined with a firmisternian shoulder-girdle.

They constitute the largest family of the tailless batrachians, embracing considerably over one-fourth of all the species, and are distributed over nearly all the temperate and tropical regions of the globe, except Australia, New Zealand, eastern Polynesia, and Hawaii. Most of the species are more or less aquatic in their habits, but many are arboreal; some are terrestrial, and a few burrow in the ground. Several of the larger species are used for food in various countries and are considered great delicacies. Like all the other batrachians they are highly useful in destroying injurious insects.

Many of the frogs belonging to this family, especially those with large digital disks, resemble the tree-toads to a high degree; so much so in fact that until a comparative recent date they were referred to the latter, from which they differ radically, however, in their osteological characters. Nevertheless, there is an "external" character—i. e., one that can be ascertained without dissection—which will enable us to properly place them, viz, the lateral or median prolongation of the posterior free edge of the tongue so as to form two lateral "horns" with a deep median incision, or a single median "horn," as in the genus Oxyglossus. All the species known to occur within our territory are provided with two lateral posterior horns on the tongue.

Two genera only are represented in Japan and adjacent territory.

a Type; description. p. 90; figs. 71-75.

b Types of M. undulata.

KEY TO THE GENERA OF JAPANESE FROGS.

- o¹ Distal and penultimate phalanges of digits continuous, without any kink separating them, there being no bone intercalated between them a (species occurring in Japan proper have tips of digits simple without regular disks)......Rana p 95

Genus RANA b Linnæus.

- 1758. Rana Linnaus, Syst. Nat., 10 ed., I, p. 210 (type, R. temporaria); 12 ed., 1766, I, p. 354
- 1814. Ranaria Rafinesque, Specchio Sci (Palermo), II, fasc. 7 (substitute name for Rana).
- 1843. Pelophylar Firzingen, Syst. Rept., p. 31 (type, Rana esculenta).
- 1891. Crotaphitis Schicke, Jahresher. Naturw. Ver. Magdeburg 1890, p. 176 (type Rana temporaria).
- 1891. Baliopyqua Schilze, Jahresber, Naturw. Ver. Magdeburg, 1890, p. 177 (type, Runa esculenta).

Only such synonyms are here enumerated as refer directly to Japanese species or are additional to those quoted in recent synonymies.

The numerous species may be identified by the following:

SYNOPSIS OF THE SPECIES OF RANA RECORDED FROM JAPAN AND ADJACENT TERRITORY.

a¹ A distinct dorso-lateral fold.

- b1 Heels not overlapping
 - c1 Vomerine teeth between chosnie.

 - d^x Dorso-lateral fold as broad as interorbital space, no longitudinal glandular ridges between dorso lateral folds R plancy, p. 101
- - c1 Tips of digits without regular disks.

 - d^2 Hind legs much less than twice as long as head and body.
 - e¹ A very prominent knob, rudiment of pollex, on inner side of first finger, R. holsti, p. 105
 - e² No promment knob (not to be confounded with copulary excrescences) on inner side of first finger.
 - f¹ Snout long, pointed distance from orbit to tip of snout longer than width between black stripes at anterior border of orbit . R japonica, p. 107
 - f² Snout short, blunt; distance from orbit to tip of snout not longer than width between black stripes at anterior border of orbit.
 - g¹ Vomerme teeth between choann, only their posterior end projecting backwards beyond them; webs large R temporaria, p. 113
 - go Vomerine teeth behind level of choanse, or nearly so; webs between toes small
 - h Inner metatarsal tubercle rather large R tsushimensis, p. 116
- "It is well not to rely upon the "kink," but to ascertain the presence or absence of the intercalated phalanx by dissection.

b Latin name for frog.

- a2 No dorso-lateral fold.
 - b. No tooth-like protuberance in lower jaw.
 - c Distance of nostrii from eye much less than twice that from edge of hp.
 - d Tips of digits not dilated into disks
 - d^p Tips of ingers dilated into distinct disks.

 - e² Skin above very rough, with warts in circular clusters of smaller surrounding larger ones R ishikawa, p. 132
 - c² Distance of nostril from eye twice that from edge of lip.......R. narina, p. 134 b² Two large tooth-like protuberances in lower law.
 - c' Interorbital width much greater than width of upper eyelid. . R. namiya, p. 136

RANA NIGROMACULATA a Hallowell.

Plate X, fig. 1.

- 1765. ?Rana chinensis Оввеск, Reise Ostind, China, I (р. 244); Voy. China (Engl. ed.), I, 1771, р. 299 (Canton, China).
- 1838. Rana esculenta Schlegel, Fauna Japon, Rept., pp. 109, 139, Saur. et Batr., pl. iii, fig. 1 b. Japan) (not of Linnæus). Martens, Preuss, Exped. Ost-Asien, Zool, I, 1866, p. 111 (Yokohama), 1876, p. 384 (Yokohama and Nagasaki, -Hilgendorf, Sitz. Ber. Berlin. Naturf. Fr., 1880, p. 119 (Tokyo). Fritze, Mitt. Deutsch. Ges. Ost-Asiens, V, 1891, p. 239 (Yezo), -Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg, (8), XVII, No. 1, 1905, p. 337, part. Tokyo, Amurland, etc.).
- 1858. Rana worlds Bleeker, Natuurk. Tijdschr Nederland Indië, XVI, p. 204 (Japan) (not of Linnseus).
- 1859. Rana esculenta var japonica Малск, Putesh, na Amur (р. 153) (not R. temporaria var. japonica Guenther, 1858).—Воплаве, Cat. Batr. Sal. Brit. Mus., 1882, р. 40. Japan, Chefu, Chusan, Shanghai, Ningpo Gigliotti and Salvadori, Proc. Zool. Soc. London, 1887, р. 595 (Fusan, Korea) Воетгове, Offenbach, Ver. Naturk. 26-28. Вет., 1888, р. 93 (Peking; Shanghai. Окара, Cat. Vert. Japan, 1891, р. 67 (Suwo; Yamaguchi; Tokyo, Mino, Gifu, Awaji).
- 1860. Rana marmorata Hallowell, Proc. Phila Acad., 1860, p. 500 (type-locality, Simoda, Japan; type, U.S.N.M. No. 12159; Dr. Morrow, collector) (not of Massalongo, 1854). Camerano, Att. Accad. Sci. Torino, XIV, Pt. 5, Apr., 1879, p. 871 (Tokyo; Yokohama).—Fox, Science (n. s.), XII, Nov. 9, 1900, p. 717.
- 1860 Rana nigromuculata Hallowell, Proc Phils. Acad., 1860, p 500 (type-locality, Japan; Dr. Morrow, collector).
- 1860. Rana ragona Hallowell, Proc Phila Acad., 1860, p. 499 (part only: specimens from Simoda) (not of Schlegel).
- 1867. Hoplobatrachus reinhardtu Peters, Mon Ber Berlin Akad. Wiss., 1867, p 711 type-locality, Malacca or China) — Rana reinhardti Moellenborff, Journ. N. China, Br R. Asiat. Soc. (n. s.), XI, 1877, p. 105 (Peking)

From the Latin, signifying black-spotted.

b Reproduced in this work on Plate X, fig. 1.

1868 Tomopterna porosa Core, Proc. Phila Acad., 1868, p. 139 (type-locality, Kanagawa, type in Mus. Comp. Zool, Cambr. No. 305; Dr. Gulick, collector). Rana porosa Bollenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 40.

1880 Rana esculenta marmorata LATASTE, Bull Soc Zool France, V, 1880, p. 61

Peking, Le Natural (1880 p. 210) not of Massalongo, 1854).

1891. Rana esculenta var augromaculata Bottender Proc Zool Soc. London, 1891. pp. 376, 377, 383 (Yokohama: Hakone Lake, Okinawa shima, Riu Kiu) Boettoer, Kat. Batr. Mus. Senckenberg, 1892. p. 6 (China and Japan...—Bedriaga Przewalski Reise, Zool, III, Pt. 1, 1899 (p. 11) — Werner, Abh. Bayer Akad. Wiss. Muenchen), II, Klasse, Pt. 2, 1904, p. 358 (Shanghai and Hankow China)

1897 Rana esculenta var chinensus Bottengen, Tailless Batr Eur., II, p. 272, fig D, p. 273 (Korea and Japan to southern China and Siam) Méhely,

Zichy's Dritte Asiat Forschungsr , 11, 1901, p. 62 (Peking).

1899. Rana chinensis Stone, Proc Phila Acad , 1899, p. 183 (Khingan mountains and Lama-mio, castern Mongolia)

In an article on "The names of animals, published by Osbeck in 1765," Mr. W. J. Fox states that Osbeck's Rana chinensis is "without doubt a Rufo," and that "Boulenger has erred in referring it to Rana, as Osbeck says in his description, 'the body above warty,' which sufficiently indicates that the species is not a Rana." Now, if Mr. Fox had known R. tigerina and R. rugosa, he would not have said this, since they are a great deal more warty than many a Rufo. There are points in Osbeck's description which show that the animal was "without doubt" a Rana and that Boulenger did not err in so referring it.

Whether Boulenger was right, however, in referring Rana chinensis Osbeck to the eastern representative of R. esculenta is another question, and as I have grave doubts as to the correctness of this view I prefer to leave the name with a l as unidentifiable. The expression "the body is warty at the top" (to use the English translation of 1771) might be applied to the frog in question, but it applies much better to Rana tigerina, which is also sold in the markets of Hongkong and Canton. With this agrees also the character: "The throat is white, speckled with black." On the other hand, Osbeck's allusion to the "sixth or innermost" finger seems to fit better the larger metatarsal tubercle of R. nigromaculata. As the name can not therefore be applied with absolute certainty to either of these species I think it is better to dispense with it altogether.

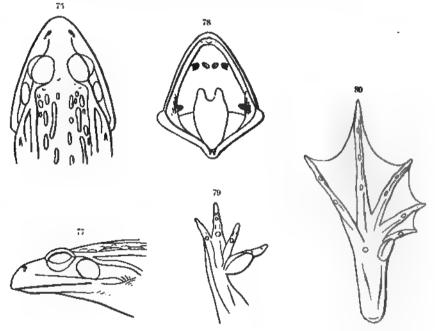
Mr. Fox's plea for Rana marmorata Hallowell, 1860, as the proper name for the eastern frog can not be entertained either, as that name was disposed of by Massalongo six years earlier b for one of the European forms of Rana esculenta.

[&]quot;Science (n. s.), XII, Nov. 9, 1900, pp. 716-718

b Kana csculenta var. murmorata Mussalongo, Saggio di un' erpetol popol. Verones 1854 (p. 47).

There seems to be no good reason for applying a trinominal to this eastern representative of Rana esculenta. The character of the numerous short dermal ridges on the back between the dorso-lateral folds seems absolutely diagnostic. Moreover, in proportions it differs more from its nearest neighbor, Rana ridibunda, than from the more remote forms of R. esculenta inasmuch as the heels do not overlap. Finally, it has not been shown as yet that the range of our species meets that of any of the western forms.

The types of R. nigromaculata of Hallowell (collected by Doctor Morrow) are not in the National Museum, but the description fits our species fairly well. The types of his R. marmorata, however, are still



Figs, 76-80. Rana nigromaculata. Nat size. 76. head from above, 77. head from side; 78, open mouth, 79. underside of hand, 80. underside of foot. No. 7415. U.S.N.M.

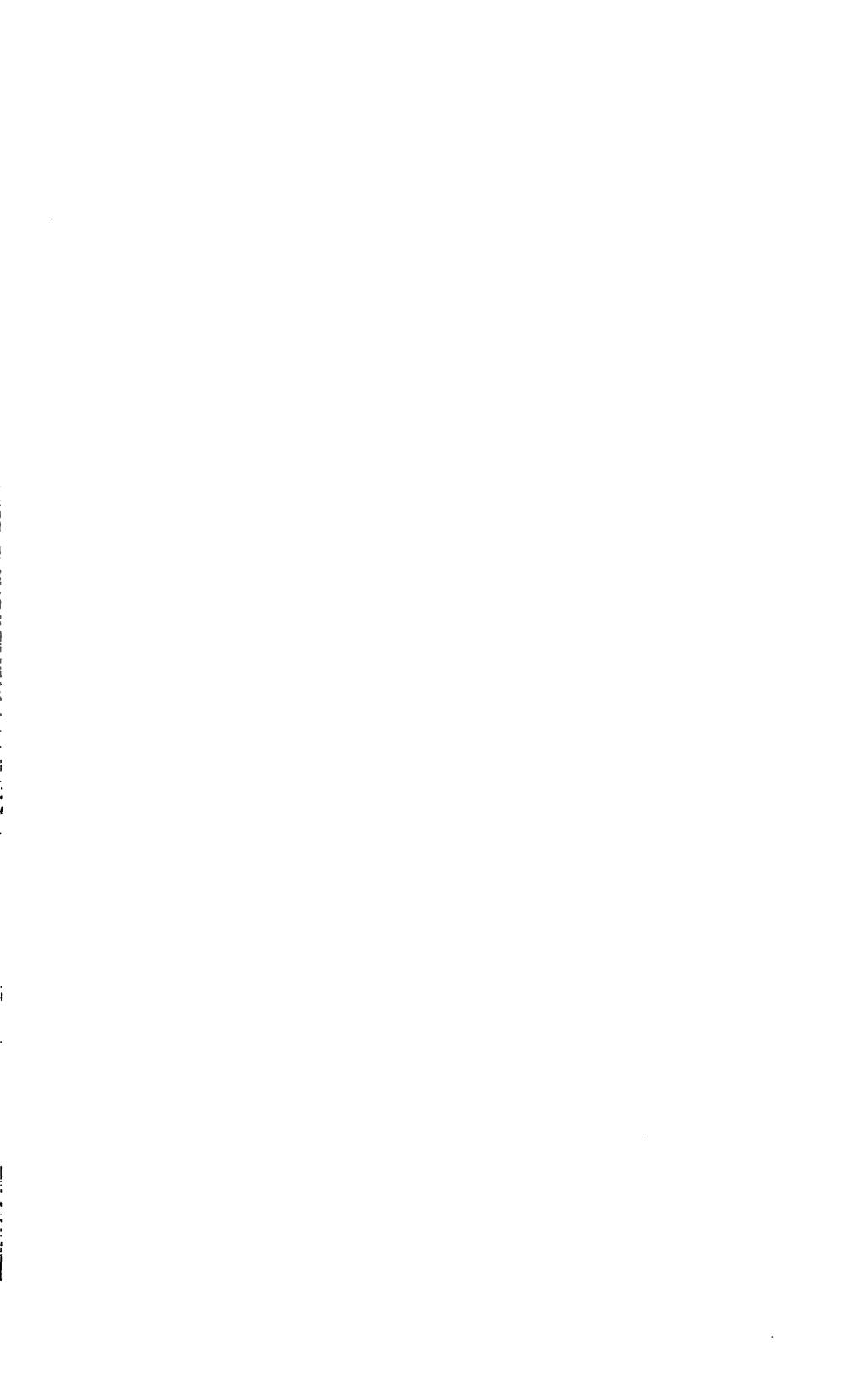
in good state of preservation (U.S.N.M. No. 12159), being apparently two females very much like the specimen figured by Schlegel (l. c.) as R. esculenta.^a Hallowell's measurements were apparently taken (in a rather careless manner) from the smaller specimen. It is worthy of note that Hallowell referred several other specimens, males with large vocal vesicles (U.S.N.M. No. 7415, figs. 76-80), to Rana rugosa, thus enumerating the specimens of the same species, and practically from the same locality, under three different specific names.

A young specimen in the collection of the Philadelphia Academy of Sciences (No. 15256) collected by Dr. W. H. Jones, at Chemulpo,



FIG. 1, RANA NIGROMACULATA FIGS. 2-4, R. RUGOSA (FROM SCHLEGEL.)

FOR EXPLANATION OF PLATE SEE PAGE 554



Korea, August, 1890, is almost without spots on the back and has an oblique black line behind the tympanum suggesting the ear spot of R. japonica—Such a specimen is superficially much like the latter species, but the much shorter tarsus and femur, the much larger inner metatarsal tubercle, and the longitudinal dermal ridges on the back between the dorso-lateral ridges at once indicate R. nigromaculata.

Description.—Adult male: U.S.N.M. No. 23579, Yokohama: September, 1896; L. Steineger, collector. Vomerine teeth in two slightly oblique groups between the choanse, their posterior end extending somewhat behind the latter; nostrils somewhat nearer the eye than the tip of the snout; distance between nostrils equals their distance from orbits; interorbital space narrow, scarcely more than half the width of upper evelid; tympanum slightly longer than high, its longest diameter four-fifths that of the eye, and more than twice its distance from the latter; first finger considerably longer than second, its basal phalanx and the metacarpal on the innerside provided with a large swollen pad very minutely granulated; tips of digits tapering, obtusely pointed, the terminal phalanx being set off from the rest of the digit by a fold across the joint which is markedly more distinct than on the other joints; toes about threefourths webbed, the deepest incision of the webs on both sides of fourth toe scarcely reaching the end of its basal phalanx; subarticular tubercles small but distinct; inner metatarsal tubercle large, projecting, sharp, its length nearly four-fifths the length of the first toe from the anterior end of the tubercle a distinct outer metatarsal tubercle; no tarsal fold; hind limb being carried forward along the side of the body the tibio-tarsal joint reaches the anterior border of the eye; heels do not meet when hind limbs are bent at right angles to axis of body; a strongly marked dorso-lateral fold from posterior border of eye to insertion of hand limb; between these folds about four series of somewhat irregular but sharply marked longitudinal dorsal folds, the longest about as long as upper eyelid; skin above indistinctly shagreened, more coarsely granular on the sides and on the posterior aspect of the femur, transversely rugose on the belly, nearly smooth on chest and throat; a large external vocal sac on each side below the angle of the mouth. Color (in alcohol) above brownish olive with longitudinal blackish spots, one surrounding each dorsal glandular fold; dorso-lateral folds paler brownish, a narrow pale bluish line from the snout down the median line of the back, sides with irregular blackish spots which encroach upon the lower edge of the dorsolateral fold; upper surface of limbs with dusky spots which form crossbars on femur: upper lip with a few small dusky spots; underside uniform whitish.

Dimensions.

Total length, tip of snout to vent	. 60
Width of head	. 22
Length of fore leg	. 34
Length of hind leg, tip of longest toe to vent	. 92
Length of tibia	. 25
Diameter of tympanum	. 5
Length of inner metatarsal tubercle	

The adult female (U.S.N.M. No. 23576) lacks the vocal sacs and the swollen pad at the base of the first finger, but agrees in other respects closely with the description of the male given above.

Variation.—My September specimens from Yokohama are all essentially like the ones described above. The specimens collected by Doctor Smith in Shikoku on May 11, as well as Owston's from Mount Fuji, also collected in May, differ chiefly in coloration, the black pigment being much more concentrated, the pale areas consequently lighter, and the whole appearance brighter and with greater contrasts. Thus the pale median dorsal line is greatly widened and the ground color between it and the dorso-lateral folds so darkened as to entirely obscure the dorsal spots; a black line runs from tip of snout through nostril and eye bending down sharply behind the tympanum; the dark blotches on the hind legs form distinct and strongly contrasted cross-With the elongation of the blackish coloration on the back there is associated a distinct lengthening of the dorsal glandular folds so that they run together into long irregular ridges. Jouy's specimens from near Seoul, which were taken in June, are very much like the ones from Shikoku, and so are Hallowell's types of R. marmorata. The difference is evidently seasonal.

Habitat. -Widely distributed in eastern Asia from Vladivostok (Hamburg Mus., No. 871, collected by Dieckmann) in the North to Bangkok, Siam (Brit. Mus.), in the South. Maack collected it on the Amur and Ussuri rivers and Radde in the Khingan Mountains. It is recorded from numerous localities in China, such as Peking (Moellendorff and Lataste); Shanghai, Kiukiang, Chapu, Hankow (Boettger); Chefu, Chusan, Ningpo (Boulenger); Ordos (Przewalski). There are specimens in British Museum from Broughton Bay and Gensan, Korea; in the Philadelphia Academy from Chemulpo (No. 15256), and others in the U.S. National Museum from Seoul and Fusan. Stone records it from the Khingan Mountains and Lama-mio in eastern Mongolia.

On the map in Boulenger's Tailless Batrachia of Europe (at p. 263), showing the distribution of the Rana esculenta group, the present species is also indicated as inhabiting Formosa, though I am unable to state upon what evidence this is done.

In Japan proper R. nigromaculata is recorded from the provinces of Suwo and Mino and on the island of Awaji (Okada); from Naga-

saki and Yokohama (von Martens); Tokyo (Okada and Hilgendorf); Miyazaki on Kiusiu, Sumiyoshi, near Osaka, Koriyama Province, Yamato, Yokohama and Simoda in Hondo (U.S.N.M.); Hakone Lake (Brit. Mus.). The United States National Museum also has specimens collected in Shikoku by Dr. H. M. Smith. Buerger's and von Siebold's numerous specimens in the Leiden Museum (Nos. 1946–1947) are only labeled "Japon." The museum in Stockholm has specimens brought home by the Vega Expedition from Biwa, Yokohama, and Hirosami.

The only record of its occurrence in Yezo is by Doctor Fritze, who states that it is "common in every pond." I am not aware that authentic specimens were identified, and the statement needs corroboration.

There is a specimen (male) in British Museum, received from G. E. Mason, said to be from "Great Loo Choo Island," but this locality is also open to question. Whether the specimens from Oo-shima (Amami-o-shima) recorded by Hallowell as R. rugosa really belong to this species must remain unsettled until that island can be thoroughly explored.

oughly exp		isu icilia	anscoured diffin	nau isiana	
		List of sp	ecimens of Rana nigroma	culata.	
Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected or from whom re- ceived.
U.S.N.M.	a 7415		Simoda, Hondo	May, 1855	W. Stimpson.

		nge.		lected	•	ceived.
U.S.N.M	a 7415	Male a	Simoda, Hondo	May,	1855	W. Stimpson.
Do	b 7416	Male	do	do		Do.
Do	a 8852	Female	Japan	· · · · · · · · · · · · · · · · · · ·	• • • • •	?
Do	b 8852	Halfgrown	do	! !		?
Do	c 8352	do	do	; , • • • • • • • • • • • •		?
Do	a 12159	Female b	Simoda, Hondo	! :		Doctor Morrow.
Do	b 12159	do	do	, 		Do.
Do	22188		Japan	İ		?
Do	22189	[do			?
Do	23 576	Female c	Yokohama, Hondo	Sept.,	1896	L. Stejneger.
Do	23577	do	do	do		Do.
Do	23578	do	do	do		Do.
Do	23579	Male d	do	do		Do.
Do	23580	Female	do	do		Do.
Do	23581	do	do	do		Do.
Do	23582	do	do	do		Do.
Do	23583	do	do	do	• • • •	Do.
Do	23584	do	¹do	do		Do.
Do	23585	do	do	do		Do.
Do	23586	do	do	do		Do.
Do	26045	Halfgrown	do	do		Do.
Do	30739	Male	Miyazaki, Kiusiu			C. A. Clark.
Do	31799	do	Sumiyoshi, near Osaka	Apr. 11,	1903	H. M. Smith.
Do	31800	do	do	do		Do.
Do	31808	Young	Koriyama, Yamato		:	Do.
Do	31815	Halfgrown	do	Apr. 26,	1903	Do.
Do	31816	do	;do	do		Do.

[•] Figs. 76-80; recorded by Hallowell as R. rugosa.

b Types of R. marmorata.

c Description, p. 98.

d Specimen described, p. 97.

List of specimens of Rana nigromaculata— Continued.

Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected or from whom received.
U.S.N.M	31902	Female	Kochi, Shikoku	May 11,1903	H. M. Smith.
Do	31903	Male	do	.!do	Do.
Do	31927	Halfgrown	do	do	Do.
Do	31928	do	do	do	Do.
Do	31933	Female	do	do	Do.
Do	31934	do	do	.;do	Do.
Do	31935	Male	do	do	Do.
Do	3193%	Female	do	. ˈ do	Do.
Do	31937	do	do	. do	Do.
Do	31938	do	do	.]do	Do.
Do	31939	Halfgrown	do	.]do	Do.
Do	31940	do	do	do	Do.
Do	31941	Male	do	do	Do.
Do	34413	Halfgrown	Mount Fuji, Hondo	. May, 1896	A. Owston.
Do	34414		do	_	Do
Do	34415	do	do	.ido	Do.
Do	34416	do	do	do	Do.
Do	34417	do	do	do	Do.
Do			do		Do.
Do	34419		do		Do.
Do	34420		do		Do.
Do			do	. •	Do.
Do	34422		'do		Do.
Do	34423	-	do	1	Do.
Do			do		Do.
Do	34425	•	do	l i	Do.
Do		•	do	_	Do.
Do			do		· Do.
Do			do		Do.
Do			do		Do.
Po			do		Do.
Do		!	do		Do.
Do			do		•
				•	Do.
Do	31465	٠.	Yokohama, Hondo	•	Do.
Phila. Acad	14421		Simoda, Hondo		Dr. Morrow.
U.S.N.M	17512	_	Fusan, Korea		P. L. Jouy.
Do	21195		Seoul, Korea	1	Do.
Do			do,		Do.
Do		1	do		Do.
Do			do		Do.
Do			do		Do.
Do			do		Do.
Do			do		Do.
Do			do		Do.
Do			do	1	Do.
Do			do	•	Do.
Do			do		Do.
		•	do		Do.
Phila. Acad			Chemulpo, Korea		W. H. Jones.
Hamburg	871	· · · · · · · · · · · · · · · · · · ·	Vladivostok	.' 1894	Dieckmann.
		<u> </u>		·	

RANA PLANCYI o Lataste.

1880 Rana plancyi Latasta Bull Soc Zood France V 1880, p 64 type-locality, Peking China. Le Naturaliste, 1880 p 2101 Bottesger, Cat Batr Sal. Brit Mus., 1882 p 37 (Shanghai, Chusan, Ningpo, Formosa)

Description.—British Museum (one of Nos. 84, 3, 11, 1-5); Taiwan fu, Formosa; presented by Formosa Museum. Vomerine teeth in two slightly oblique groups, their posterior edge barely extending beyond the hinder edge of the choang; shout rather long, the distance from the tip to eye longer than that from the latter point to tympanum; lores concave; tympanum nearly as large as the eye; interorbital space narrower than upper evelid; first finger extending slightly beyond second; toes fully webbed; inner metatarsal tubercle rather large and strong; hand leg being carried forward the tibiotarsal joint reaches the anterior corner of the eye; heels not overlapping; dorso-lateral glandular fold prominent, scarcely as wide as the interorbital space; no longitudinal glandular ridges between the dorso-lateral folds. Color (in alcohol): Upper parts with indistinct blackish spots; underside distinctly mottled with dusky, especially on throat, chest, and thighs; marblings on posterior aspect of thigh confluent into an ill-defined band; a fairly distinct dusky band from axilla to groin.

Dimensions	77.79
Snout to vent	. 44
Snout to posterior edge of tympanum	18
Width of head	16
Diameter of eye	5.5
Width of apper cyclid	4
Interorbital width .	2.5
Snout to eye	8
Diameter of tympanum	5
Fore leg.	25
Tibia	20, 5
Width of dorso lateral fold	. 1 75

Variation.—Formosa specimens in British Museum do not have the dorso-lateral fold as broad as specimens from Shanghai (Brit Mus.), in which it is fully as broad as the eyelid, while in the Formosan ones it barely reaches the width of the interorbital space; yet it is considerably wider than in R. nigromaculata. There are no distinct glandular ridges between the folds. The vomerme teeth are between the choane, fully as far forward as in R. nigromaculata, while in the Shanhai specimens their position is somewhat more posterior. Boulenger b

a For Mr. V. Collin de Plans y attaché at the French legation in Peking, who collected the types. He is author of a Catalogue des Reptiles et Batraciens du Departement de l'Aube et Étude sur la Distribution Géographique des Reptiles et Batraciens de l'est de la France 1877, and other herpetological papers.

b Cat. Batr. Sal. Brit. Mus., p. 37.

says, "Seldom a light vertebral line," but of the 5 specimens from Taiwan fu, since received, 4 have a very distinct broad whitish line down the middle of the back. Inner metatarsal tubercle variable; in most specimens it is strong and large, while in a female from Formosa (by Dickinson) it is comparatively small.

Habitat.—Plancy's frog was originally described from Peking, and specimens from Shanghai, Chusan, and Ningpo are in British Museum.

The specimens recorded from Formosa are all in British Museum, the only ones with a definite locality being from Taiwan fu.

List of	of s	pecimens	of	Rana	plancyi.
22000	<i>y</i> ",	<i>[</i>	.,	2 6 (4 7 6) 4	<i> </i>

Museum.	Number.		Locality.	1646-641.	By whom collected.
Brit. Mus	65, 10, 29, 37		ormosa		. R. Swinhog.
Do	65, 10, 29, 38		do	· · · · · · · · · · · · · · · · · · ·	Do.
Do	79. 6. 4.25	Female	do		. Dickinson.
Do	84. 3.11. 1	т	aiwan fu, Formosa		Formosa Mus.
Do	84 3, 11, 2		do		. Do.
Do	84 3.11. 3		do		Do.
Do	84. 3.11. 4	·	do		Do.
Do	84. 3.11. 5		do		. Do.

RANA OKINAVANA a Boettger.

1895. Rana okinarana Boettger. Zool. Anz., XVIII. July 8, 1895, p. 266 (typelocality, Okinawa shima. Riu Kiu; types, Mus. Senckenberg. No. 1072, 1a); Offenbach. Ver. Naturk. 33–36 Ber., 1895, p. 103.

This species is not represented in any of the collections which have reached the U. S. National Museum or the Science College Museum in Tokyo. I owe the inspection of the two type specimens in the Senckenberg Museum in Frankfort on the Main to the kindness of Doctor Boettger, whose original description I give below in translation. I have only to add that the heels do not overlap. A third specimen also from the late Mr. B. Schmacker, whose Japanese collector obtained them in the Riu Kius, is in the Bremen Museum according to Doctor Boettger.

Original description by Doctor Boettger. Adult female; Senckenberg Museum, No. 1072; Okinawa shima. In general similar to R. lateralis Boulenger, but with shorter snout and more robust; vomerine teeth in two rounded bundles beginning on a line with the posterior border of the choanæ and separated from them as well as from each other by equal intervals; head moderately large; snout short, anteriorly slightly pointed, and somewhat produced, as long as the diameter of the eye; nostrils equidistant from tip of snout and eye; canthus rostralis angular, loreal region slightly depressed longitudinally; interorbital space scarcely broader than the upper eyelid; tympanum very distinct, three-fourths the size of the eye; fingers moderately

long, first longer than second; toes three-fifths webbed and in addition with narrow dermal margins to the last phalanx; tips of digits truncate but without distinct disks, subarticular tubercles well developed; inner metatarsal tubercle oval, prominent, but less than half the length of the inner toe; no outer metatarsal tubercle, the adpressed hind leg reaches between anterior border of eye and nostril; skin on back and underside rather smooth, on the sides with large flat warts: a narrow, high, strongly swollen dorso-lateral glandular fold; a second fold beginning beneath the eye and ending above the shoulder in two round or oval glandular aggregations. Upper side gray, frequently with a fine, somewhat lighter median dorsal line; a black wedge-shaped spot from nostril through eye extending over the temporal region, a blackish line bordering the upper lip and separated from the freno-temporal spot by a pure white band which ends on the glandular protuberances above the insertion of the arm; tympanum brown, dorso-lateral fold externally edged with black, the sides being often entirely blackish; posterior extremities with dark cross bands; posterior aspect of femur whitish vellow with black spots and marblings; underside whitish vellow, spotted and dotted all over very densely with blackish brown, the underside of the head, however, being mostly uniform blackish gray.

Dimensions

	Female	Female	Female.
	191 211	n m	หเฑ.
Length of head and body	40	42	46
Length of head	16	16.5	17
Width of head	15	15.5	16
Diameter of tympanum	3, 5	.1.5	4
Fore logs	22. 5	24.5	25
Hind legs .	67	7.5	76
Tibis	20. 5	22. 5	¢ 23. 5

4 Boettger, Zool Ang , XVIII 1865 pp 266-267

Remarks. - The Rana lateralis Boulenger with which Boettger compares this species is described from Tenasserim and is related to R. malabarica from Malabar and the Bombay hills. R. okinavana appears, then, to be of decided Indian affinities.

Habitat. There is no record of this species having been observed beyond the type locality, Okinawa shima in the Riu Kiu Archipelago.

List of specimens of Rana okmarana

Минении	Numoer	Sex	Locality	When ool- lected.	By whom collected or from whom obtained
Benckenberg Do	1072,1 1072,1	Fendles do	Okinawa shima,		B Schr. acker Do.

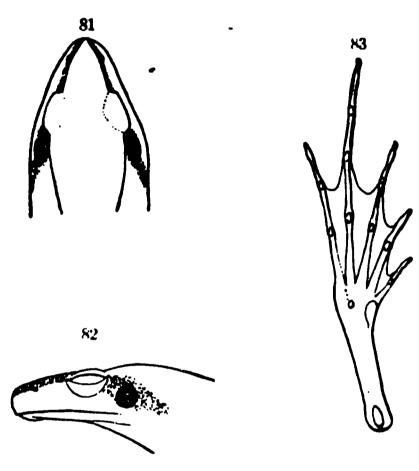
a Type description, p. 102.

RANA LONGICRUS a Stejneger.

1898. Rana longicrus Steineger, Journ. Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 216 (type-locality, Taipa, Formosa; type, Sci. Coll. Mus. Tokyo, No. 26; T. Tada, collector).

The head and body of this species resembles greatly R. japonica, the snout being fully as pointed and elongated, but the most remarkable character is the excessively lengthened hind legs which are actually more than twice as long as the head and body together. Even the fore legs partake of this elongation, though less markedly. The coloration is that characteristic of the group.

Description of type-specimen.—Adult; Science College Museum, Tokyo, No. 26; Taipa, Formosa; September, 1896; T. Tada, collector (figs. 81-83). Vomerine teeth in two oblique groups



FIGS. 81-83.—RANA LONGICRUS. NAT. SIZE: 81, TOP OF HEAD: 82, SIDE OF HEAD: 83, UNDER SIDE OF FOOT. NO. 26, Sci. Coll. Tokio.

behind a line through the center of the choanæ, and projecting backward beyond the latter; snout long, pointed, distance from tip to eye much greater than horizontal diameter of orbit; nostril nearer the tip of the snout than the eye; interorbital space much wider than upper eyelid; tympanum two-thirds the diameter of the eye; first finger not extending beyond second; no knob-like protuberance on inner side of thumb; tip of digits not tapering, obtusely rounded; webs of feet deeply excised, the incision of the web on both sides of fourth toe reaching the middle of the basal

phalanx; subarticular tubercles well developed; inner metatarsal tubercle strongly developed, outer one barely indicated; hind legs extremely elongate, the distance from anus to tip of longest toe twice as great as length of head and body; tibio-tarsal joint of extended hind leg reaching beyond the tip of the snout by the width of the head at the center of the eye; kneejoint of adpressed limb reaches the axilla; heels overlap by the length of the forearm; skin smooth, back and sides indistinctly shagreened with a few irregular tubercles on the sacrum; posterior aspect of femurs coarsely granulated; a narrow, but very distinct dorso-lateral fold on each side from posterior border of eye to insertion of hind leg, the nearest approximation of the two folds being equal to the distance between

the anterior corners of the eyes. Color (in alcohol) above pale drab, a with a few distinct and irregular small dusky spots between eyes, on the middle of the back and along the outer edge of the dorso-lateral fold; a distinct dark brown line from tip of snout through nostril to eye, the upper edge being sharply defined, the lower fading gradually into the loreal region; from eye to shoulder a large, sharply defined oblong spot of dark brown covering the tympanum; upper and lower lips marbled brown and whitish; pale indications of the usual mark on the upper arm as well as cross-bars on fore and hind limbs; an ill-defined brown line along outer aspect of femur and tibia, underside of tarsus, and fifth toe.

Dimensions.

	mm.
From snout to vent	52
From snout to posterior edge of tympanum	17
From snout to corner of mouth	16.5
Width of head	15
Diameter of eye	4.5
Width of upper eyelid	3
Interorbital width	4
From eye to nostril	4.7
From eye to end of snout	8
Diameter of tympanum	3
From eye to tympanum	2
Fore limb	34
Elbow to tip of longest finger	24
•	105
Thigh	29
Tibia	3 6
Metatarsal tubercle	1.5

Habitat.—This species is only known from Formosa, Mr. T. Tada having collected a single specimen at Taipa, September, 1896.

List of specimens of Rana longicrus.

Museum.	No.	Age.	Locality.	When collected.		By whom collected.
Sci. Coll., Tokyo	26	Adulta	Taipa, Formosa	Sept.,	1896	T. Tada.

^a Type; description, p. 104; figs. 81-83.

RANA HOLSTI b Boulenger.

1892. Rana holsti Boulenger, Ann. Mag. Nat. Hist. (6), X, October, 1892, p. 302 (type-locality, Okinawa shima, Riu Kiu; type, Brit. Mus. No. 92.9.3.19; Holst, collector).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 865; author's separate, p. 16.

a Ridgway, Nomencl. Col., Plate III, fig. 18.

b For the late Mr. P. A. Holst, who collected the type.

As stated by Boulenger, this species, which is one of the largest of the group, is particularly well characterized by the knob on the inner side of the first finger, and by the elongate inner metatarsal tubercle. The nostrils are considerably nearer the end of the snout than the eye, and there is no outer metatarsal tubercle. The interorbital width is also rather unusual. I have had the privilege of examining the unique type specimen, but I have nothing to add to Boulenger's original description, which is therefore reproduced herewith.

Original description of type specimen.—Adult female; British Museum No. 92.9.3.19; Okinawa shima, Riukiu; Holst, collector (fig. 84). Near R. temporaria; vomerine teeth in two well-developed oblique groups behind the level of the choang; head broader than long; snout rounded, slightly prominent, as long as the diameter of the



Fig. 84 -Ranaholsti Natrige, Underside of 1994 Hand No. 92,9,349, Brit-Mes.

orbit: loreal region nearly vertical, slightly concave; nostrils a little nearer the end of the snout than to the eye, the distance between them equal to the interorbital width, which equals the width of the upper eyelid; tympanum very distinct, circular, measuring two-thirds diameter of eye and about once and a half its distance from orbit; fore limb longer than tibia; first finger extending considerably beyond second; tips of fingers blunt, subarticular tubercles strong; a very prominent knob (rudiment of pollex) on inner side of first finger; tibio-tarsal articulation reaching the eye; tibia slightly longer than foot, half length of

head and body; toes three-fourths webbed, the two distal phalanges of fourth toe free, but with the membrane prolonged as a narrow fringe on each side; subarticular tubercles strong; inner metatarsal tubercle blunt, elliptical, not very prominent, three-fifths length of inner toe; no outer metatarsal tubercle; no tarsal fold; back with a few scattered small warts, sides and hind limbs with numerous warts; body and limbs with whitish pearl-like excrescences; glandular lateral folds prominent, broken up into warts behind, nearly parallel, the distance between them on the scapular region two-ninths length of head and body. Olive-brown above, sides with blackish spots; a blackish temporal spot; tympanum reddish brown; a light streak from below the eye to the angle of the month; limbs with dark crossbars; hinder side of thighs marbled with black; throat spotted with brown; belly with a few brown dots.

Dimensions.

	mm.
From snout to vent	120
Length of head	37
Width of head	43
Diameter of eye	12
Interorbital width	11
From eye to nostril	9
From eye to end of snout	17
Tympanum	8
From eye to tympanum	5
Fore limb	70
Hind limb	170
Tibia	58
Foot	55
Inner toe	14
Inner metatarsal tubercle	8 a

Habitat.—Only the type-specimen having been obtained thus far, we know nothing of the distribution of this species beyond the fact that it was collected by Holst in Okinawa shima.

List of specimens of Rana holsti.

Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected.
Brit. Mus	92.9.3.19	Female a	Okinawa shima, Riu Kiu	-,	P. A. Holst.

a Type; description, p. 106; fig. 84.

RANA JAPONICA b (Guenther).

Plate XI, fig. 1.

- 1838. Rana temporaria Schlegel, Fauna Japon., Rept., pp. 109, 139; Saur. et Batr. pl. 111, fig. 2 c (Japan) (not of Linnæus).—Bleeker, Natuurk. Tijdschr. Nederland. Indië, XVI, 1858, p. 205 (Japan).—Martens, Preuss. Exped. Ost-Asien, Zool., I, 1866, p. 111 (Yokohama); 1876, p. 380 (Tokyo and Yokohama).—Hilgendorf, Sitz. Ber. Ges. Naturf. Fr. Berlin, 1880, p. 119 (Tokyo).
- 1858. Rana temporaria var. japonica Guenther, Cat. Batr. Sal. Brit. Mus., p. 17 (Ningpo and Chusan, China; Japan.)
- 1860. Rana sylvatica Hallowell, Proc. Phila. Acad., 1860, p. 500 (Simoda, Hondo) (not of Le Conte).—Camerano, Atti Accad. Torino, XIV, Pt. 5, Apr., 1879, p. 876 (Tokyo; Yokohama).
- 1879. Rana japonica Boulenger, Bull. Soc. Zool. France, 1879, p. 190 (Japan); 1886, p. 599 (Japan; China); Cat. Batr. Sal. Brit. Mus., 1882, p. 47 (Japan; Szechuen and Ningpo, China).—Boettger, Offenbach. Ver. Naturk. 26–28 Ber., 1888, p. 96 (Peking); Kat. Batr. Mus. Senckenberg., 1892, p. 9 (Nikko and Yokohama, Japan; Dalanshan, near Ningpo, Da-dschiao-sy, near Peking, Lueshan, near Kiukiang, Lake Tahoo, near Shanghai, China); Offenbach. Ver. Naturk. 33–36 Ber., 1895, p. 102 (Oh

^a Boulenger, Ann. Mag. Nat. Hist. (6), X, 1892, pp. 302-303.

b Signifying Japanese.

c Reproduced in this work on Plate XI, fig. 1.

- shima or Okinawa).—Okada, Cat. Vert. Japan, 1891, p. 67 (Tokyo; Awaji; Suwo).—Werner, Abh. Bayer. Akad. Wiss. (Muenchen), II Klasse, XXII, Pt. 2, 1904, p. 358 (Shanghai).
- 1886. Rana martensi Boulenger, Proc. Zool. Soc. London, 1886, p. 414 (type-locality, Tokyo; types, Berlin Mus. Nos. 4410-4411; Martens, collector).—BOETTGER, Kat. Batr. Mus. Senckenberg., 1892, p. 10 (Ekingami, near Yokohama).
- 1886. Rana martensii Boulenger, Bull. Soc. Zool. France, 1886, p. 599; author's separate (p. 5).
- 1904. Rana japonica var. ornativentris Werner, Abh. Bayer. Akad. Wiss. (Muenchen), II Klasse, XXII, Pt. 2, p. 383 (type-locality, Nikko, Hondo, Japan; type in Zool. Mus. Akad. Wiss. Munich; Doctor Haberer, collector).
- R. japonica seems chiefly characterized by the pointed snout. This character is seconded by rather long legs, the tibio-tarsal joint as a rule reaching beyond the snout, though in several specimens falling short of it. The inner metatarsal tubercle is rather strong.

From this I can not separate R. martensi, based by Boulenger upon Yedo (now Tokyo) specimens. I have examined the cotype in the British Museum, a rather short-legged female, but I can find no character, neither in the position of nostrils, metatarsal tubercle, fingers, nor coloration, which will separate this specimen from a large series of true R. japonica; it has also the pointed snout of the latter.^a

Description.—Adult male; U.S.N.M. No. 23549; Yokohama, Hondo; Sep. 1896; L. Stejneger, collector (figs. 85-89). Vomerine teeth in two oblique patches on a line with the center of the choanæ and extending slightly behind the latter; snout long, pointed, the distance from orbit to tip of snout longer than width between black stripes at the anterior border of orbit; nostrils nearer the tip of snout than the eyes; interorbital space equals the width of upper eyelid; tympanum about two-thirds the diameter of eye, and slightly more

^a The frogs of the Rana temporaria group present some of the most difficult problems to the student, even with authentic specimens of all the forms at hand, and nowhere do the perplexities seem greater than with the species inhabiting the area of which we The principal difficulty consists in the fact that several of the described species are said to occur in the same localities, and are based upon characters which seem vanishing in a large series. Thus R. japonica and R. martensi are presumably both from central Japan, yet in no publication have I been able to find their characters contrasted. In a vague way it is intimated that the former is more nearly related to R. dalmatina (=agilis Thomas), the latter to R. temporaria, but that is in itself but scant consolation inasmuch as both R, japonica and martensi agree with R, temporaria in the character in which it is stated that the latter differs from R. dalmatina. That I am not the only herpetologist disconcerted by this state of affairs is plain from Dr. O. Boettger's remarks upon a number of specimens from Chinhai, northeast of Ningpo, China (Ber. Senckenberg. Naturf. Ges., 1894, pp. 146-147), which he refers to the three species R. amurensis, martensi, and japonica in spite of a number of discrepancies between the specimens and the descriptions, which, it seems to me, break down the barriers between them.

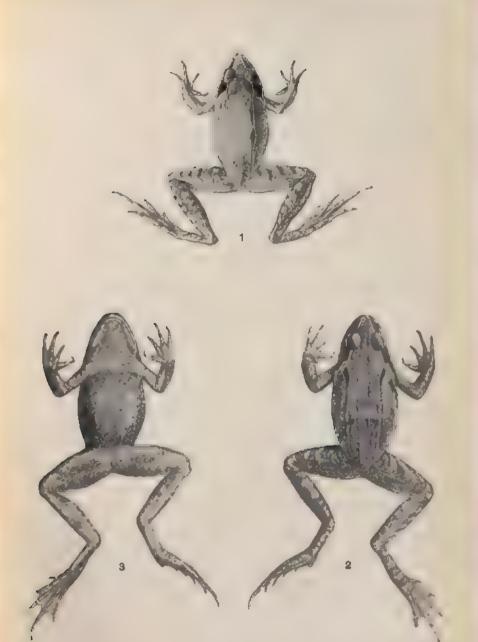
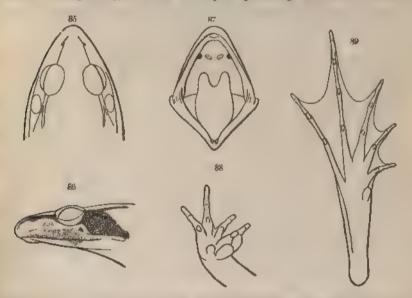


Fig. 1, Rana Japonica, Figs. 2, 3, R, Amurensis. (From Schlegel and Boulenger.)

FOR EXPLANATION OF PLATE SEE PAGE 554.

than twice its distance from the latter; fingers obtuse, first extending beyond second, and provided with a large double swelling on the inner side, the surface of which is minutely granulated; tip of toes tapering; webs considerably excised, the incision on both sides of fourth toe extending to the distal third of the basal phalanx; subarticular tubercles rather weak; inner metatarsal tubercle rounded, projecting; no outer metatarsal tubercle; tibio-tarsal joint of extended hind leg reaches the snout; total length more than one and three-fourths times the length of tibia; heels overlapping; skin above obscurely shagreened with numerous small rounded tubercles on the back mostly irregularly placed, except those on the shoulder, which form a V-shaped figure with the apex pointing forward; a narrow



Figs. 85-89.—Rana Japonica 11 x nat size 85 top of head, 80, side of head, 67, open mouth, 88, underside of hand, 89 underside of foot. No 23540, U.S.N.M.

dorso-lateral glandular ridge on each side from eye to insertion of hind leg, the shortest distance between the two being considerably greater than the distance between the anterior angles of the eyes; underside smooth, except posterior aspect of femurs, which is coarsely granular; a small vocal sac below each corner of the mouth. Color (in alcohol) pale clay-color (Ridgway, Nomenel. Col., pl. v, fig. 8) the dorso-lateral ridge but slightly paler; the latter is marked on the outside by a series of btack spots almost forming a continuous line; all the tube cles on the back and sides including the interscapular V marked with a 'ack spot; a blackish brown line from tip of snout through nostril to e ', and a large patch of the same color behind the eye descending of inquely toward the insertion of the fore limb and covering the tympanum; a

blackish line on the anterior face of the upper arm and dusky crossbars on the hind legs with round blackish spots on the light interspaces; underside uniform whitish.

Dimensions.

	m 74.
Total length, tip of snout to vent	60
Width of head	19
Fore lcg	32
Hind leg, tip of longest toe to vent	107
Tibia	34

The adult female (U.S.N.M. No. 23548, same locality, date, and collector) is essentially like the male described above, except that the body is broader and the dorso-lateral ridges consequently farther apart, the fore legs less robust, and the swelling on the first finger, which is characteristic of the male sex, absent; the web between the toes is also somewhat more excised. The color is more reddish brown, with scarcely any black spots on the back except those marking the inverted V on the shoulder. Both upper and lower lips are blotched with dark brown.

The young specimens are mostly perfectly smooth above, without any tubercles between the dorso-lateral folds.

Variation. -- This species offers a great amount of individual varia-The most variable character is the length of the hind legs, for, while in most specimens the tibio-tarsal articulation reaches just beyond the snout, in a few it falls short, while in others it extends considerably farther. The longest hind legs in our collection are possessed by an adult female (No. 31828) collected by Dr. Hugh M. Smith at Yamagawa, Satsuma, Kiusiu, but other specimens in the same lot (for instance, No. 31829) can be exactly matched in every respect by the general run of specimens of corresponding size from central Japan. (for instance, No. 34465). The situation of the nostrils relative to the tip of the snout and the correlated length and pointedness of the snout also vary considerably, but in no case have I been able to trace any correlation with length of hind legs or geographic distribution. color varies greatly; the ground color with regard to the amount and tinge of the brownish or yellowish admixture, the dark spots and bands with regard to intensity and number. Spots are frequently absent, and the male described is rather unusually dotted with black above. The underside is not always uniform white; in many specimens there are brown spots and mottlings on throat or even on chest, but no connection with distribution or structural characters can be discovered.

There is a young specimen in the collection of the Philadelphia Academy of Sciences (No. 15257), collected by Dr. W. H. Jones at Chemulpo, Korea, August, 1890, which appears even more slender and long-snouted than the Japanese specimens, but this may be due

to its somewhat dried-up condition. The web between the toes is very deeply excised, however, more so than in any Japanese specimen examined by me.

Habitat. Rana japonica, besides inhabiting Japan, is said to occur also in eastern China. Specimens are on record from Szechuen, Ningpo, the neighborhood of Peking, Kiukiang, and Shanghai, and I have already referred to the specimen from Chemulpo, Korea, in the Philadelphia Academy.

The specimens in the Leiden Museum collected by von Siebold and Buerger (No. 1930) are only labeled as from "Japan." In Museum Senckenbergianum there are specimens from Nikko and Yokohama, in Berlin from Tokyo, in Hamburg from Yamato and Kawachi. In the United States National Museum there are numerous specimens from Yamagawa, Province of Satsuma, Kiusiu; from Shikoku, Yokohama, and from Mount Fuji. Okada has recorded it from the island of Awaji and from the Province of Suwo, Hondo.

The Senckenberg Museum, in Frankfurt on the Main, in 1889 received from the late Mr. B. Schmacker, of Shanghai, several specimens said to have come from Yezo. One of these is now in British Museum (No. 91, 8, 26, 16), where I have had the opportunity of examining it. It is identical with Yokohama specimens and, if the locality is correct, then both R. japonica and R. temporaria occur in Yezo. It would be very important to have this question thoroughly investigated. The species has not been found there by others and, as it is not claimed that Mr. Schmacker collected the specimens in Yezo personally, confirmation is necessary.^a

Doctor Boettger has referred two half-grown specimens which were collected by Mr. Schmacker's Japanese collector, either in "Ohoshima or Okinawa," to this species, the only record for the Riu Kius. One might be tempted to regard these as possibly young Rana holsti were it not for certain discrepancies in the description, Boettger's specimens having a distinct outer metatarsal tubercle and the tibio-tarsal articulation extending far beyond the tip of the snout. Under these circumstances they are not likely to be from Okinawa or Ohoshima

List of	0.33441	850 at 95 at	519	Rana	127	2010/09/20 20 19/20
44 144 (3)	4 DEL	25 55 39 41 E	177	A PARACLE	756	ranser of "

Museum	No	Sex and age.	Locality	When col- lected	By whom collected or from whom re- curved
U.8.N.M .	11336	Halfgr	Japan	1878	F 8 Morse.
Do	11341	, do	de	1878	Do
Do	11342	Young	do .	1878	Do
Do,	11343	de	do	1878	Do
Do	11344	do.	do	1878	Do

[&]quot;It is to be noted that several other species from the same source are under similar suspicion, as, for instance, Eumeces latiscutatus (p. 199) and Natrix tigrina (p. 139).

List of specimens of Rana japonica—Continued.

Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected or from whom received.
8. N. M	23548	: : Female-	Yokohama, Hondo	Sept., 1896	L. Stejneger.
Do	23549	Male "	do	do	Do.
Do		J	do		Do.
Do	23551	 do	do	do	Do.
Do	23552	¹ Female .	do	do	Do.
Do	23553	do	do	do	Do.
Do	23554	do	do	do	Do.
Do	23555	do'	do	do	Do.
Do	23556	do	do	do	Do.
Do	23557	Male	do	do	Do.
Do	23558	Fe alc.	do	do	Do.
Do	23559		do		Do.
Do	23500	do	do	do	Do.
Do	23561	1	do	1	Do.
Do	23562	1	do		Do.
Do	23563		do		Do.
Do	23564		do		
Do	23565		do		<u>:</u>
Do			do	•	ı
Do	23567		do		
_	_	i	do		Do.
Do			do		
Do	23560		do		
Do	23570				
Do			do		
Do	23572		do		
Do			do		1
Do	23574		do		
Do	2357.5		do		
Do	51828	Female: -	Yamagawa, Satsuma Kiusiu.	i, ' June 14, 1903 	H. M. Smith.
Do	31829	Adult c.	do	do	Do.
Do	31×30	Young	do	'do	Do.
Do	31831	•	do		
Do	31907		Kochi, Tosa, Shikoku		Do.
Do	31908		do		Do.
D o	31909		do		Do.
Do	31910		do		Do.
Do	31911		do		Do.
Do	31912	•	do		Do.
Do	31922		do		
Do		-	do		
Do		1	do		
Do			do		
Do			do		Do.
Do			Mount Fuji, Hondo		
			-	_	
Do			do		. Do.
Do			do		Do.
Do	34451				
Do	34452		do		Do.
	34453	00	do		Do.
Do			•	1	I The
Do	34454	Halfgr	do	do	Do. Do.

a Description, p. 110.

b Description, p. 108, figs. 85-80.

List	of	specimens	of	Rana	ia	ponica	-Con	tinued.
23000	Υ)	opcomen	Ψ,	100100	J~I	DOIDEC	C.O.11	mucu.

Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected or from whom received.
U.S.N.M.	34457	Halfgr	Mount Fuji, Hondo	May, 1898	A. Owston.
Do	34458	do	do	do	Do.
Do	34459	do	do	do	Do.
Do	34460	do	do	do	Do.
Do	344 61	do	do	dn	Do.
Do	34462	do	do	do	Do.
Do	34463	do	do	do	Do.
Do	344 64	do	do	do	Do.
Do	34465	do	do	do	Do.
Do	34466	do	do	do	Do.
Do	34467	do	do	do	Do.
Phila. Acad	15257	Young a	Chemulpo, Korea		W. H. Jones.
Leiden	1930	i	Japan		Siebold and Buerger.
Brit. Mus	44. 2. 22. 10		do		Do.
Do	 	(b)	Tokyo		von Martens.
Do	91. 8. 26. 16	(°)	Yezo[?]		ı
Hamburg	1005		Yamato	1896	T. Lenz.
Do	1006		Kawachi	1896	Do.

.a P. 110.

b Cotype of R. martensi.

c P. 111.

RANA TEMPORARIA a Linnæus.

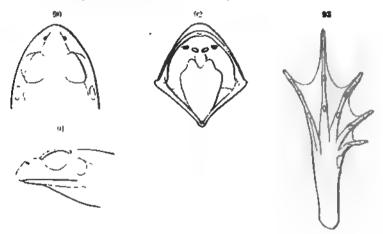
- 1758. Rana temporaria Linnæus, Syst. Nat., 10 ed., I, p. 212 (type-locality, Europe); 12 ed., 1766, I, p. 357.—Middendorff, Sibir. Reise, II, Pt. 2, 1853, p. 247, pl. xxvi, figs. 2-4 (River Aldan to Udskoi Ostrog).—Dobrotvorski, Izvest. Sibirsk. Otd. Geograf. Obstch., I, 1870 (p. 23) (southern Sakhalin).—Boulenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 44 (Europe; Abrek Bay, Amur Prov.); Bull. Soc. Zool. France, 1886, p. 594 (Yezo; Kasakevitch and Abrek Bay, Amur Prov.; Wiloni river; Mongolia); Ann. Mag. Nat. Hist. (6), V, Feb., 1890, p. 140 (Amurland; Yezo); Taill. Batr. Europe, II, 1898, p. 301, pls. xx-xxi.—Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg, LX, Prilozh., no. 5, 1889, p. 292 (Sakhalin); Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, no. 1, 1905, p. 348 (Russia to Amurland, Sakhalin, etc.).
- 1768. Rana muta LAURENTI, Synops. Rept., p. 30.
- 1788. Rana rufa Lacèpéde, Hist. Nat. Quadr. Ovip., I, Syn. meth.
- 1853. Rana cruenta MIDDENDORFF, Sibir. Reise, II, Pt 2, p. 249, pl. xxvi, figs. 5-7 (southern coast of Okhotsk Sea) (not of Pallas?).—Maack, Putesh. na Amur, 1859 (p. 153) (Amurland).
- 1855. Rana fusca Thomas, Ann. Sci. Nat. (4), IV (p. 365).
- 1876. Rana dybowskii Guenther, Ann. Mag. Nat. Hist. (4), XVII, May, 1876, p. 387 (type-locality, Abrek Bay, near Vladivostok; type in Brit. Mus.; B. Dybowski, collector).—Stone, Proc. Phila. Acad., 1899, p. 183 (Khingan Mountains, eastern Mongolia).
- 1902. Rana muta johanseni Kastchenko, Izvest. Tomsk Univers., 1902 (p. 24).

a Signifying temporary, in the present case, perhaps, in the sense of changeable. Application somewhat uncertain, but possibly meant for temporalis, with reference to the blackish temporal spot.

Various synonyms referable only to some European form or phase are here omitted.

Rana temporaria, as compared with R. japonica, is a much more short-legged and short-snouted species with the dorso-lateral folds apparently wider. Altogether it is larger and stouter, the body especially between head and pelvis being relatively longer. Thus in my specimens of R. temporaria from Yezo, the length of the foot, measured from inner metatarsal tubercle to tip of longest toes, exactly equals one-half the distance from anterior border of eye to vent, while in R. japonica the length of the foot, similarly measured, is about two-thirds the same distance.

I have compared our three Japanese specimens from Yezo with specimens of corresponding sex and size from Norway (for instance, No. 25339, Bergen) and find no tangible differences. The web



Figs. 90 (c) Toxical Domination (b) Naturally in the other properties of the proper

between the toes is perhaps a trifle more excised, and the inner metatarsal tuberche a trifle stronger, but these differences are clearly within the range of individual variation

Description. Adult female; U.S.N.M. No. 23440; Sappero, Yezo; S. Nozawa, collector (figs. 90-93). Vomerine teeth in two slightly oblique groups, the anterior border of which extends forward slightly beyond a line through the posterior border of the choanse; snout short, rounded, the distance from orbit to tip of snout equaling the distance between black stripes at anterior border of orbit; nostrils nearer the tip of snout than the eye; interorbital space as wide as the upper cyclid and a little narrower than distance between the nostrils; tympanum vertically oval, its greatest diameter about three-fourths the diameter of the eye; distance of tympanum from eye less than

one-half the former's greatest diameter; fingers blunt, first finger extending slightly beyond second; incision of web on both sides of fourth toe a trifle deeper than the distal end of the basal phalanx; inner metatarsal tubercle slightly compressed, its length equaling its distance from subarticular tubercle of first toe; no outer metatarsal tubercle: tibio-tarsal joint of extended hind limb reaches center of eye; tibia less than half the length of head and body; heels overlapping by less than interorbital width; skin above and below smooth, except posterior aspect of femur, which is coarsely granulated; the dorso-lateral glandular folds but slightly raised, their shortest distance contained five times in total length | Color (in alcohol) above brownish gray, slightly grayer on shout, with obscure and ill-defined darkbrown mottlings, which on the back and sides occasionally surround a light spot so as to form ocelli; dorso-lateral folds lighter, externally margined by an ill-defined brown line; indications of a dusky band across the top of the head through the center of the upper evelids: upper lip mottled with brown; a brown line from tip of snout through nostril to eve expanding behind the latter to form the usual darkbrown ear-patch; brown stripe on anterior face of over arm long and parallel with the axis; limbs cross-barred; underside whitish, the whole surface coarsely marbled with brown.

Dimensions.

				771 173
Total length tip of snor	at to vent			56
Width of head .				17
Fore limb				31
Hind limb, vent to tip.	of longest toe			87
Tibia		,	 	 . 27

Males differ from females in the stronger, more muscular fore limbs, which acquire an extraordinary development during the pairing season; in the pad-like swelling of the inner side of the first finger, which becomes covered with black horny spinules during the same season; in the greater development of the web between the toes; and in the presence of a pair of internal vocal sacs, situated at the sides of the throat. "

Variation.—Apparently this species is much less variable than R. japonica, especially if we consider its great geographical distribution. The presence of more or less numerous glandular warts on the upper surface and sides, so conspicuously absent in the specimen described above, depends on the season, they being best developed during the breeding time, in museum specimens also to some extent on the state of preservation and the preserving fluid employed. The color, however, varies greatly both as to the tint of the ground color and as to the amount and distinctness of the dark markings, some

specimens being nearly uniform above, others densely blotched with blackish.

Habitat.—The typical R. temporaria occurs in the more northern portions of the Palearctic region, from the British Islands and Scandinavia in the west, to Japan in the east.

In the St. Petersburg Museum there are numerous specimens from the Amur and Ussuri valleys. The Berlin Museum has a specimen from Kasakevitcha near the junction of the Ussuri and Amur rivers, and British Museum has another from Abrek Bay not far from Vladivostok, the type of R. dybowskii. In the Hamburg Museum there are specimens from Khabarovka, Poprovka and Nikolayesk, Amurland, collected in 1894 by Dieckmann. Nikolski reports that this frog is not common in Sakhalin, where he found it in the river Duiki and Dobrotvorski in the southern part of the island.

The occurrence of this species in Yezo, therefore, is only what might be expected. British Museum has five specimens from this island, collected by Dr. John Anderson, and our museum has also three Hokkaido specimens collected by Dr. S. Nozawa near Sapporo. In the St. Petersburg Museum there is a specimen from Nemuro, collected by Grigoriew.

For the possible occurrence of R. japonica in Yezo see under the latter species. Here I may emphasize only the fact that the specimens there alluded to certainly belong to this species and not to R. temporaria, and the only question is whether the locality is correctly given or not.

Museum,	No.	Sex.	Locality.	When collected.	By whom collected.
J.S.N.M	. 23438	Femalo	Sapporo, Yezo		S. Nozawa.
Do	. 23439	do	do	•••••••	Do.
Do	. 23440	do.a	do	•••	Do.
Brit. Mus	. 86, 6, 30, 18	1	Yezo		J. Anderson.
Do	. 19		do		Do.
Do	. 20		do		Do.
Do	. 21	,	do		Do.
Do	. 22		do		Do.

List of specimens of Rana temporaria.

RANA TSUSHIMENSIS, a new species.

Diagnosis.—Rana temporaria group; vomerine teeth behind level of choanæ; snout short, the distance from orbit to tip of snout not greater than width between black stripes at anterior border of orbit; tibio-tarsal articulation reaching beyond eye or tip of snout; distance between dorso-lateral glandular folds contained five or six times in

a Description and figs., p. 114.

^a Signifying from Tsushima, in the Straits of Korea, between the south end of Korea and Kiusiu, Japan.

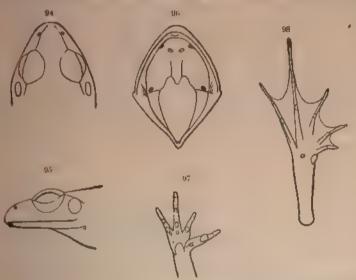
length from shout to vent; inner metatarsal tubercle oval, less than one-half its distance from tip of inner toe; first finger extending beyond second; tibia shorter than fore limb, tympanum about one-half the diameter of eye, from which it is separated by about one half its own diameter; distance between nostrils considerably greater than interorbital width; webs between toes deeply excised, three terminal phalanges of fourth toe being free.

Type. - U.S.N.M. No. 17519; Tsushima; May, 1885; P. L. Jouy,

collector.

Habitat. Tsushima, Japan.

This new species is probably nearest related to Rana amurensis. It shares with it the short, rounded snout, and the deeply excised webs, but the inner metatarsal tubercle is considerably stronger and larger.



In this respect it agrees with R temporaria, but has more deeply excised webs, narrower interorbital space, narrower dorso-lateral folds, and slightly longer legs, being on the whole of slenderer build From R, japonica it differs by its short, rounded shout and its much shorter bind foot. The vomerine teeth are decidedly further back than in R, temporaria and japonica though not quite so far as in R, anarrensis.

Description of type-specimen (figs. 94-98). Vomerine teeth in two oblique groups their anterior border on a line with the posterior border of the choane; snout short, the distance from orbit to tip of snout equals the width between the black stripes at anterior border of orbit; nostrils half-way between eye and tip of snout, their mutual distance being much greater than their distance from the eye or than the interorbital space, which is narrower than upper eyelid; vertical diameter of tympanum greater than horizontal, a trifle more than onehalf the diameter of eye, and more than twice the distance of tympanum from eye; first finger slightly extending beyond second; webs of toes deeply excised, barely reaching the middle of basal phalanx of fourth toe; inner metatarsal tubercle oval, projecting, slightly shorter than its distance from subarticular tubercle of first toe; a strong conical outer metatarsal tubercle; subarticular tubercles strongly developed; tibio-tarsal articulation of extended hind leg reaches almost to the nostril; tibia one-half the total length; heels overlapping by the width of the interorbital space; skin above with numerous small scattered granules, those on the sides larger; dorso-lateral glandular folds very narrow and sharply defined, their shortest distance being contained about five times in the total length; lower surface smooth except the proximal half of the posterior aspect of the femur which is granular. Color (in alchol) above uniform pale drab, with a few minute dusky spots on the back; the brown stripe from tip of snout to eye, very narrow, and the tympanic dark patch rather pale and ill-defined between eye and tympanum; humeral stripe and crossbars on limbs obscure; underside uniform whitish.

Dimensions.	
	mm.
Total length, shout to vent	52
Width of head	16. 5
Fore limb	30
Hind limb, tip of longest toe to vent	83
Tibia	26

The male (U.S.N.M. No. 17520; Tsushima; May, 1885; P. L. Jouy, collector) is smaller (total length 37 mm.), with relatively longer tibia (20 mm.). The snout is somewhat shorter, with the nostrils nearer to the tip than to the eye; tympanum slightly larger and nearer the eye; first finger has the swollen pad set with asperities, characteristic of the breeding male; webs less excised, reaching to the anterior third of the basal phalanx of fourth toe; outer metatarsal tubercle barely indicated; tibio-tarsal articulation reaching tip of snout, overlapping by more than interorbital space; shortest distance between dorso-lateral folds one-sixth the total length; lower back and sides with numerous small, white-tipped, pointed tubercles, and in addition on sides large glandular warts. Color like the female, but canthal stripe and ear-patch darker and better defined; underside densely sprinkled with minute brown dots.

Remarks. -Most of the differences between the two specimens as pointed out here are sexual, the relative shorter body, the pad on the first finger, the greater extent of the webs indicating the male. The

most notable difference, however, is the presence of the strongly developed outer metatarsal tubercle in the female specimen.

There are a number of specimens from Tsushima, in British Museum, collected by Holst, and in 1898 I was given the privilege of examining them, but I find no reference to the presence of an outer metatarsal tubercle, which may therefore be regarded as problematical. These specimens were referred partly to R. japonica and partly to R. martensi. My own examination led me to the conclusion that they belong to one species only, as I could not correlate any two of the various differences. They were all short-snouted, with deeply incised webs and narrow dorso-lateral folds.

Habitat.—Only known from Tsushima, in the channel between Japan and Corea, where specimens were collected by P. L. Jouy, in May, 1885, and later by P. A. Holst.

List of specimens of Runa tsushimensis.

May, 1985 P. L. Jody
.do . Do
P A Holst

RANA AMURENSIB @ Boulenger.

Plate XI figs 2 3

1853 Rana temporaria Middendorff, Sthir Reise II, II, Pt I, p 247, pl xxvt, fig 3 a c (Eastern Siberia

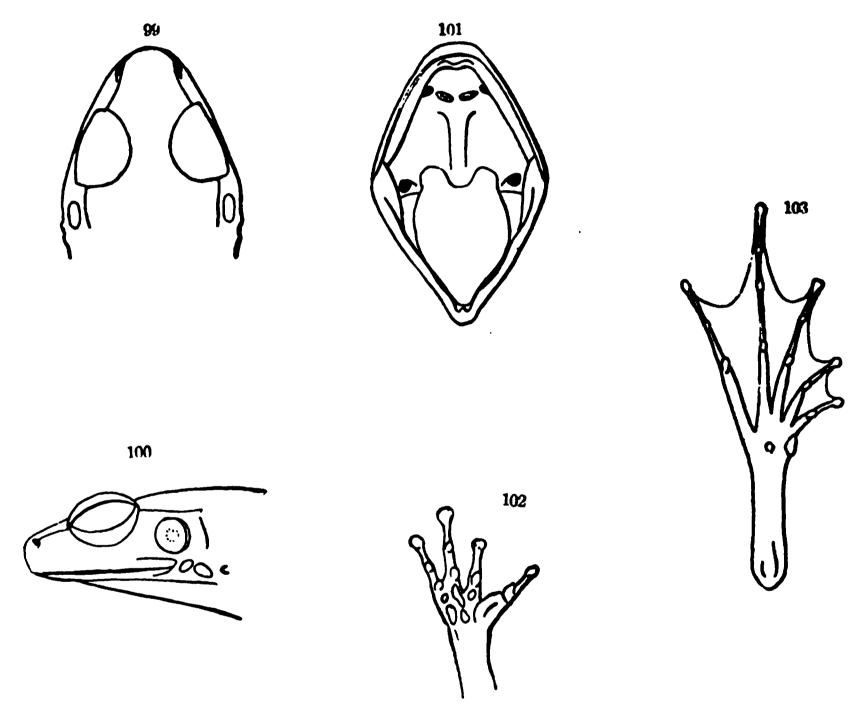
1886 Rana amazensis Bot lenger Bull Soc Zool France, 1886, p. 598, author's separate p. 1. ctype-locality Kazakevitch, Amur Province type, Berlin Mus, No. 9864), Ann. Mag. Nat. Hist. (6,, V, Feb., 1890, p. 140, pl. tx, fig., 15 (Lake Khanka, Doerries collector, Chemulpo, Korea. Proc. Zool. Soc. London, 1890, p. 324. ? Boetrofit, Ber. Senekenberg. Naturf. Ges., 1894, p. 146 (Chinghai, near Ningpo, China. Bedrixos. Przewalski Reise. Zool., HI, Pt. 1. 1899, (p. 27. = Nikolski. Zap. Imp. Akad. Nauk., S. Peterburg. (8). XVII. No. 1. 1905, p. 369 (Kuku-Nor, Tibet.)

Rana amurensis seems to be closely related to true R. temporaria, being round-shouted and short-legged. It differs, however, in the more posterior position of the vomerine teeth which are almost entirely behind the level of the choans and, apparently, in having the interorbital space narrower. The inner metatarsal tubercle is also unusually weak. As the two forms occur in the same locality, the Berlin Museum having also true R. temporaria (No. 9865) from Kazakevitch, whence came the type of R. amurensis, there seems to be no doubt as to the specific validity of the latter.

Having no specimen at command, though it was my good fortune to be allowed to examine the Ussuri and Korean specimens in the Brit-

a Signifying from Amurland. b Reproduced in this work on Plate XI, figs. 2-3,

slightly narrower than the upper eyelids; canthus rostralis rather abruptly bent; lores concave; tympanum one-half the diameter of the eye; fingers free, first extending slightly beyond second; disks distinct, but small, on third and fourth finger largest, less than half the diameter of tympanum; toes moderately webbed, the two terminal phalanges of fourth toe being free and the excision reaching to the terminal third of the basal phalanx of that toe; disks well developed but small, slightly smaller than those of the fingers; subarticular tubercles very prominent; inner metatarsal tubercle oval, not prominent, small, contained about two and a half times in length



Figs. 99-103.—Rana ijim.e. Nat. size. 99, top of head; 100, side of head; 101, open mouth; 102, underside of hand; 103, underside of foot. No. 19 (914) Sci. Coll. Tokyo.

of first toe, measured from the anterior border of the tubercle; a distinct outer metatarsal tubercle at the base of fourth toe; no outer dermal fringe on fifth toe, nor a tarsal fold; tibio-tarsal articulations reach considerably beyond tip of snout when hind legs are stretched forward, and overlap by as much as the length of the snout when folded legs are placed at right angles to axis of body; tibia more than one-half the total length of head and body; skin above obscurely shagreened, with a few scattered pustules on the back and numerous ones on the flanks; sides of face and neck and upper side of tibia with numerous white-tipped, pointed asperities, which also stud the

tympanum like a string of pearls, as well as three large glandular warts behind the corner of the mouth; from the posterior angle of the eye a somewhat indistinct dorso-lateral fold, which on the shoulder seems broken up into a series of shorter longitudinal glands; underside smooth, except posterior aspect of femur, which is granular. Color (in alcohol) dark chocolate brown, apparently nearly uniform, the dorso-lateral folds and upper side of limbs paler, more cinnamon, a whitish line under eye and on posterior part of upper lip, which is mottled with brown along the edge; flanks pale brownish, with irregular blackish spots; legs cross-barred with dark brown and upper posterior aspect of femur mottled with the same color; underside whitish, with very faint brown mottlings on throat, chest, and hind legs.

1 constitutions	
	min.
Total length, tip of snout to vent	68
Width of head	23
Distance between nostrils .	7
Distance between nostril and eye	5
Diameter of eye	9
Diameter of tympanum	4.5
Interorbital space	8
Fore leg	44
Largest finger disk	2
Hind leg vent to tip of longest toe	118
Tibia	38
Inner metatarsal tubercle	2 25

Habitat. -Thus far this species is only known from Okinawa shima, where the type specimen was collected.

List of specimens of Rana isimæ

Marento	No.	Age	Locality	1	When col- lected	By whom collected
Sci. Coll. Tokyo.	19 914)	Adulta	Takabanura, Okmawa shi-			
			i 16			

"Type description p .21 figs 99-103

RANA RUGOSA " Schlegel.

Plate X, figs 2/4

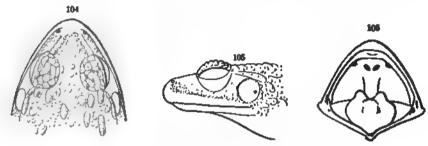
1838 Rano rugosa Schegel, Fauna Japon, Rept, p. 110, Sauri et Batt, pl. nt, figs. 3, 46 (type-locality, Japan, probably Nagasaki, types, Leiden Museum No. 2064, von Sichold, collector. Di Merit and Bibron, Erpét. Gén. VIII, 1841, p. 368 (Japan). Glenther, Cat. Batt. Sal. Brit. Mus., 1858, p. 11 (Japan). Bleeker, Natuurk Tijdschr Nederland Indië, XVI, 1858, p. 204 (Japan). Hallowell, Proc. Phila. Acad., 1860, p. 499 (part. Stmoda) - Martens Preuss Exped. Ost-Assen, Zool., I. 1866, p. 111 (Yokohama. 1876, p. 384. Nagasaki). Camerano, Atti. Acad. Torino, XIV,

[&]quot;Latin, signifying wrinkled b Reproduced in this work on Plate X, figs, 2-4.

i

Pt. 5, Apr. 1879, p. \$68 (Tokyo, Yokohama).—Hildendorf, Sitz. Ber. Ges. Naturf. Fr Berlin, 1880, p. 119 (Yokohama; Hakone Mts.).—Boulenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 35 (Japan).—Orada, Cat. Vert. Jap., 1891, p. 67 (Tokyo; Suwo).—Fritze, Mitth. Deutsch. Ges. Ost-Asiena, V, 1891, p. 239 (Yezo).—Borttore, Kat. Batr. Mus. Senckenberg., 1892, p. 4 (Hakone Lake; Nikko; Yokohama)—Irada, Annot. Zool. Japon., 1, Pt. 3, Aug. 1897, p. 114 (breeding season).

Hallowell's R. rugosa a belongs only partly to this species, being evidently composed of two species. The small ones "marked 13 in the catalogue . . . found along the mountain streams at Simoda, Japan, May, 1855," which he describes as "presenting the conical pustulations upon the longitudinal elevations upon the back," are in all probability true R. rugosa, but the others from "Ousima," and the two larger ones from Simoda, of which the last-mentioned ones are in our collection (U.S.N.M. No. 7415) belong to R. nigro-maculata. This blunder of Hallowell's is the more remarkable, as R. rugosa is one of the most easily recognized species, because of its



Figs. 104–106.—Rana rugosa. $1\frac{1}{4}$ > nat size. 104, top of head; 105, side of head; 106, open mound. No. 23543, U.S.N.M.

excessive roughness, which makes it appear more like a toad than a frog. The hollow snout is also quite characteristic.

Description.—Adult female; U.S.N.M. No. 23543; Yokohama, Hondo; September, 1896; L. Stejneger, collector (figs. 104-106). Vomerine teeth in two small groups, their anterior border on a line through the center of the choame and more distant from the latter than from each other; nostrils much nearer the tip of snout than the eye; snout and lores concave, the canthus rostralis forming a ridge separating the two concavities; interorbital space less than width of upper eyelid; tympanum nearly circular, fully three-fourths the diameter of the eye distant from the latter less than one-half its own diameter; fingers not tapering, rounded at end, first somewhat opposable and longer than second, with a small swollen pad at the base; webs of toes full, the excision opposite the distal end of the first phalanx of fourth toe; inner metatarsal tubercle small and rather

^a Proc. Phila. Acad., 1860, p. 499.

[♦] They are not in the U.S. National Museum.

weak; a weak outer metatarsal tubercle; subarticular tubercles rather weak, the distal one triangular, with the base lorward; a decided tarsal fold; tibio-tarsal articulations reach center of tympanum when hind legs are carried forward, and do not overlap when legs are bent at right angles to axis of body; tibia less than one-half the total length; skin above and on sides densely granular, with prominent tubercles in addition to a number of irregular series of short longitudinal radges, which are largest on the middle of the back. smallest on the head, all these ridges tubercular like the rest of the skin; upper eyelids coarsely tubercular, as also the loreal region; even the tympanum is studded with smaller tubercles; no dorsolateral fold; a number of prominent tubercular glands behind tympanum; underside smooth, but transversely creased, throat and posterior aspect of femurs very coarsely granular. Color (in alcohol) dark brownish olive, with obscure dusky spots and dark cross bands on legs; underneath pale, uniformly and densely mottled with dusky.

The adult male in the breeding season (U.S.N.M. No 34436; Mount Fuji, Hondo; May, 1898) is smaller, with relatively shorter body, somewhat fuller webs, and a large swelling at the base of the first finger covered with asperities, though not so large as in the species previously described.

There are no vocal sacs, internal or external. Boulenger a says: "Male with external vocal vesicles," but as there were then no male specimens in the British Museum he probably had this information from Hallowell, who attributes large vocal vesicles to this species. As I have already shown, the specimens with such, which Hallowell took for R. rugosa, were in reality R. nigromaculata.

Variation. —On the whole, this species is very uniform, the greater or lesser distinctness of the blackish markings mostly due to a varying shade of the ground color being the chief source of variation. Hilgendorf mentions that one of his specimens (Berlin Mus. No. 4312) lacks the vomerine teeth.

Habitat.—This very distinct species appears to be confined to Japan proper, i e., to the islands of Hondo, Kiusiu, and Shikoku. Doctor

[&]quot;Cat. Batr. Sal. Brit. Mus., p. 35.

b Von Martens (Preuss Exped. Ost-Asien, Zool., I, 1876, p. 384) has recorded it from Hongkong, China—The identification, which seems to be by Peters, is probably correct, but the locality is most likely erroneous—Hallowelt records two specimens from Ooshima, but they were probably Rana aigromaculata, like the male specimens from Simoda, which he also identified as K-rugosa

Fritze is responsible for the statement that it is common in Yezo, but as he is the only writer who records it from that island it may be well to await the arrival of undoubted Yezo specimens. I am not aware that it has been found on Tsushima nor in Korea or any of the Riukiu islands.

The following definite localities from where we have reliable records or have seen specimens may be mentioned: Mountain streams at Simoda (Hallowell); mountains of Hakone (Hilgendorf); Hakone Lake and Nikko (Boettger); Yokohama (von Martens; Hilgendorf; Camerano; Boettger; Stejneger); Tokyo (Camerano); Mount Fuji (Owston); Kobe and Enoshima (Brit. Mus.); Seta, near south end of Lake Biwa, Province of Omi, collected by Dr. T. Lenz (Hamburg Mus. No. 1052); Province of Suwo, Hondo (Okada); Nagasaki (Dr. E. A. Mearns; von Martens). Dr. Hugh M. Smith obtained specimens at Koriyama, Kiusiu, and Kochi, Shikoku; also at Nara, Province of Yamato, Hondo.

The types in the Leiden Museum, which were collected by von Siebold, are only inscribed "Japon."

List of specimens of Rana rugosa.

U.S. N.M. No.	Sex and age.	Locality.	When collected.	By whom collected
11335		Japan	1878	E. S. Morse.
11337		do	1878	Do.
11338		do	1878	Do.
11339		.do	1878	Do.
11340		.do	1878	Do.
22190		do		(?)
22191		do		(*)
24543	Femalea	Yokohama, Hondo.,	Sept., 1896	L. Stejneger.
23544	Adult		do	Do.
23545	do	do	do	Do.
23546	do	do	do	Do.
23547	do	do	do	Do.
23587	do	$\mathbf{d} \cdot \mathbf{d} \cdot \mathbf{d} \cdot \mathbf{d} \cdot \mathbf{d} = \mathbf{d} \cdot $	do	Do.
26044	do	$\mathbf{do}\ldots$	do	Do.
31801	Female	Nara, Yamato, Hondo	1903	II. M. Smith.
31802	do	do	1903	Do.
31813	do	Koriyama, Yamato, Hondo	Apr. 26, 1903	Do.
31814	do	do	. do	Do.
31930	do	Kochi, Toza, Shikoka	May 11, 1903	Do.
31932	do	do	.do	Do.
34433	do	Mount Fuji, Hondo	May 1898	\. Owston.
34434	do	do	do	Do.
34435	do	., ,,do.,,,, , , , , , , , , , , , , , , , , ,	.do	Do.
34436	Male b	do	.do	Do.
34437	Female	do	.do	Do.
34438	Male	do	do	Do.
34439	do	do	do.,	Do,
		do		Do.
34441	Female	do	do	Do.

List of	s peciniens	of Rana	rugosa—Continued.

Ü. S. N. M. No.	Sex and age.	Locality.	When collected.	By whom collected	
34442	Female	Mount Fuji, Hondo	May, 1898	A. Owston.	
34443	do	do	do	Do.	
34444	do	do	do	Do.	
34445	Male	do	do	Do.	
3 444 6	Female	do	do	Do.	
34447	Halfgrown	do	do	Do.	
35275	Adult	Nagasaki, Kiusiu		E. A. Mearns.	
35276	d o	do		Do.	
35277		do	4	1	
		do		1	
5279	do	do		Do.	
35280	do	do			
,	l	do		1	
35282		do			
35283		do			
35284		do			
35285		do			
35286	•	do	1		

RANA LIMNOCHARISa Wiegmann.

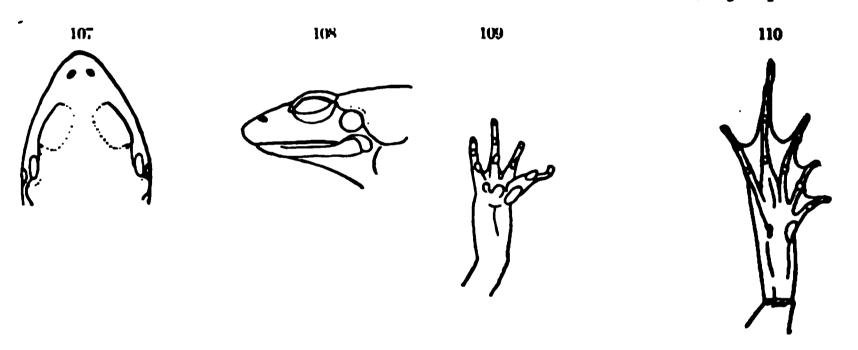
- 1835. Rana limnocharis Weigmann, Nova Acta Acad. Leop. Carol., XVII, Pt. 1, p. 255 (no type-locality; apparently based on specimens in the Leiden Museum from Java, collected and named by H. Boie).—Boulenger, Fauna Brit. India, Rept., 1890, p. 450 (China and southern Japan to India and Malay Archipelago).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 865; author's separate, p. 16 (Okinawa shima).—Boettger, Offenbach. Ver. Naturk. 33–36 Ber., 1895, p. 103 ("Ohoshima or Okinawa").—Steineger, Journ. Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 217 (Taipa and Giilan, Formosa; Botel Tobago II.; Pescadores IIs.
- 1835. Rana gracilis Wiegmann, Nova Acta Acad. Leop. Carol., XVII, Pt. 1, p. 257 (type-locality, Cape Syng-more, China; Meyen, collector) (not of Gravenhorst, 1829).—Hallowell, Proc. Phila. Acad., 1860, p. 505 (Whampoa, China).—Guenther, Rept. Brit. India, 1864, p. 409 (Ningpo; Hongkong; Riu Kiu; Himalayas; Siam; Madras).—Martens, Preuss. Exped. Ost-Asien, Zool., I, 1876, p. 383 (Tamsui, Formosa).—Boulenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 28 (East Indies; Chusan, Ningpo, Shanghai, Szechuen, Hongkong, Hainan, China; Formosa; Riu Kiu); Proc. Zool. Soc. London, 1887, p. 149 (Riu Kiu, Pryer, coll.).—Boettger, Offenbach. Ver. Naturk. 24–25 Ber., 1885, p. 159 (Japan).—Okada, Cat. Vert. Japan, 1891, p. 67 (Okinawa shima).—Brown, Proc. Phila. Acad., 1902, June 11, p. 185 (Riu Kiu, probably Okinawa shima, Furness and Hiller, coll., 1896).
- 1858. Rana vittigera Guenther, Cat. Batr. Sal. Brit. Mus., p. 9 (Ningpo; Hongkong; Riu Kiu; Ceylon; India; Java) (not of Wiegmann, 1835).—Martens, Preuss. Exped. Ost-Asien, Zool., I, 1866, p. 163 (Tamsui, Formosa).

Several names based on Indian specimens and usually referred to this species are omitted from this synonymy.

^a From $\lambda i \mu \nu \eta$, swamp, pond; $\chi \dot{\alpha} \rho \iota \varsigma$, grace, one of the Graces.

Boulenger^a regards this species as closely allied to *R. tigerina*, differing in smaller size, half-webbed toes, slight development of the fringe on the fifth toe and usually in the presence of a small outer metatarsal tubercle. One of the chief differences I find, however, is in the situation of the vomerine teeth. In *R. tigerina* they are anterior, approximated very closely to the choanæ, while in *R. limnocharis* they are posterior and quite distant from the choanæ, their distance from the latter being twice as great as their distance from each other.

Description (figs. 107-110).—Adult female; U.S.N.M. No. 31798; Onomichi, Prov. Aki, Hondo; June 4, 1903; Dr. H. M. Smith, collector. Vomerine teeth in two oblique groups, the anterior border of which is on a line with the posterior border of the choanse, their distance from the latter twice as great as their distance from each other posteriorly; nostrils a little nearer the tip of the snout than the eyes; interorbital space about two-thirds the width of upper eyelid; snout convex in cross-section, canthus rostralis rounded; tympanum



FIGS 107-110. RANALIMNOCHARIS. NAT. SIZE. 107, TOTO FREAD; 108, SIDE OF HEAD; 40., UNDERSIDE OF HOOT. NO. 36501, U.S.N.M.

circular about one-half the diameter of the eye, its distance from the latter more than half of its own diameter; fingers slightly tapering, rounded, first extending much beyond second, and even beyond fourth; a small smooth swelling at base of first finger; web between toes deeply excised to the middle of the basal phalanx of the fourth toe; inner metatarsal tubercle strong, oval, longer than one-half the first toe; a strong conical outer metatarsal tubercle; a narrow dermal fold along the outer side of fifth toe; a fold from inner metatarsal tubercle halfway up the tarsus; tibio-tarsal articulations reach the tympanum when hind legs are stretched forward, and only touch, without overlapping when legs are bent at right angles to axis of body; skin above finely shagreened, with numerous narrow, clongated glandular ridges which become shorter on the sides; no dorso-lateral fold; a deep crease on the chest in front of each arm joining another crease which runs from axilla to axilla across the chest; skin under-

a Cat. Batr. Sal. Brit. Mus., p. 28, and Fauna Brit. India, Rept., p. 450.

neath nearly smooth becoming coarsely granular posteriorly on the sides, lower belly and posterior half of femurs. Color (in alcohol) above dark reddish gray, with numerous irregular, light-edged dusky blotches; a dark chevron across the head at the center of the upper eyelids, the angle pointing backwards, and a straight dark line across the head at the anterior corner of the eyes; a narrow dark line over canthus rostralis and upper part of tympanum; several broad dark vertical marks on the upper lip and crossing to the lower, one near the tip of the snout, one below the nostrils, two below the eye; some irregular black marks on white ground in the groin; upper posterior aspect of femur marbled black and white in strong contrast; legs cross-barred; underside whitish, throat and chest densely sprinkled with dark gray.

Dimensions		
		275.712
Total length of snout to vent	 	51
Width of head		18
Fore leg		22
Hind leg vent to tip of longest toe		68
Tibia.		22

The adult male (U.S.N.M. No 23902; Kumamoto, province of Higo, Kiusiu) is smaller (38 mm.), but does not seem to differ materially in proportions; the first finger is provided with copulatory asperities which cover two separate, slightly swollen pads, one basally on the side and below, the other distally and on the upper side of the metacarpal, no asperities on the phalanges; the excision of the web is not quite so deep as in the female; a pair of external vocal sacs on the side of the throat, the openings being behind the tongue near the corner of the mouth. A broad gray band across the throat involving the vocal sacs. A very narrow white line on the upper side along the whole median line is also shown in this specimen, but this character is not sexual.

Variation. No remarkable variation is found among the Japanese specimens as regards structural characters or proportions. There is some difference in the amount of roughness of the skin on the upper surface, but this is probably due to some extent, at least, to the different state of preservation; one young specimen (No. 30744) from Miyazaki, Kiusiu, is so rough, however, even to the inclusion of the upper cyclids, that it might easily be mistaken for R. rugosa were it not for the convex snout, the narrow interorbital space, deeply excised webs, etc. In color there is greater divergence, though in the specimens from Japan proper this is chiefly confined to the presence of a narrow median white line on the back in a few specimens; none of them have the wide pale median line found in some Formosan specimens. This narrow white line is present in all the Ishigaki

Island specimens before me, and in two it is almost as broad as in those from Formosa. In the latter all three styles of coloration are present, irrespective of locality or sex.

Habitat.—This species is distributed over a wide area in southeastern Asia from Japan and China, and according to Boulenger extending throughout India, Ceylon, and Burma to the Malay peninsula and archipelago, ascending to an altitude of 7,000 feet in the Himalayas. Over this range it is probably represented by several subspecies.

It is the commonest species of frog in Formosa and adjacent islands. Von Martens reported it from Tamsui, long ago, and I have recently recorded it from Taipa and Gillan, where this species was collected by Mr. Tada in September and October, 1896. Numerous species collected by him in the Pescadores and in Botel Tobago, April and May, 1897, were reported upon at the same time.

Its occurrence in the Riu Kius was first known through a specimen in British Museum presented by Mr. A. Collie. It was obtained later by Pryer's collectors, and Doctor Fritze found it very common on Okinawa shima. From this island our museum also possesses a specimen (No. 36552) obtained from the Science College Museum in Tokyo. In the Hamburg Museum there are specimens (Nos. 530–531) collected by Doctor Warburg in Myako shima and Iriomote shima, while the U.S. National Museum has a large series from Ishigaki shima, all of the Saki shima group.

It was unknown to the authors of Fauna Japonica, but has since been attributed to Japan in a general way, though with no authentic specimens or definite locality to prove it. We have now in the U.S. National Museum numerous specimens from Kiusiu, two collected at Kumamoto, Province of Higo, on the west side, and one from Miyazaki, Province of Hiuga, on the east side. Doctor Smith brought us two specimens from Yamagawa, Satsuma, and five from Hondo, viz, one from Onomichi, in Aki, and four from Koriyama, in Yamato. Dr. E. A. Mearns obtained several young specimens above Nagasaki. Nordquist, of the Vega Expedition, also obtained it in Nagasaki during October, 1879, and at Hirosami on the 19th of the same month (Mus. Stockholm, Nos. 1034-1035 and 158-165). It almost looks as if this species is extending its range in Japan rapidly, and the inquiry seems legitimate whether it may not owe its presence in Japan proper to a comparatively recent introduction. It seems almost incredible that von Siebold should have missed this species at Nagasaki, if it had really existed there during the time of his residence near that city.

List of specimens of Rana limnocharis.

Museum.	No.	Sex and age.	Locality.	When collected.	by whom collected or from whom, received.
.S.N M	22192	Adult	Јаряп		(7)
Do	22193	. do	do		(1)
Do	23002	Males	Kumamoto, Higo, Kiusiu	1884	I. Ijima.
Do	23903	Female	do	1884	Do.
Do	30744	Young	Miyazaki, Kiusiu		C. A. Clark.
Do	31823	Female .	Yamagawa, Satsuma, Kiuslu	June 14, 1903	H. M Smith.
Do	31824	., .do	do,,,,,,,	do	Do.
Do	31798	Female b	Onomichi, Aki, Hondo	June 4,1903	Do.
Do,	31809	Young .	Korlyama, Yamato, Hondo.	1903	Do.
Do	31810	,, .do ,,	,do,,	1903	Do.
Do	31811	do	do	1903	Do.
Do	31812	do	, do,	1903	Do.
Do	34393	Male .	lehigakishima, Riu Kiu	Apr., 1809	A. Owston.
Do	34394	do	do	do	Do.
Do	34396	do	do	. do	Do.
Do	34396	Female.	do.,	do	Do.
Do	34307	do	do	do	Do.
Do	34398	Male	do	do	Do.
Do	34399	.do	,do , ,	. do	Do.
Do	34400	do.	do	do	Do.
Do	34401	Fomale	do	do	Do.
Do	34402	Male	do		De.
Do	34403	do		do	Do.
Do	34404		do		Do.
Do	34406		do	do	Do.
Do	34406		do	do	De.
Do	34407	do.	do	đo	Do.
Do	34406		do	do	Do.
Do	34409		do	do	Do.
Do		do		đo	Do.
Do			do	do	
Do	34412		,do,	do	ļ.
Do	34470		Northern Formosa	Mar , 1903	Do.
Do	MOI		do		I =
Do	35273		Nagasaki, Klusiu.		
Do	35274	do			
Do	36501	Female c.	Taips, Formoss	Sept. —, 1896	T. Tada.
Do	36502	(d)	Gillan, Formosa.	Oct1896	Do.
Do	36503		Botel Tobago II	May ,1897	Do.
Do	36504	1 ''	Pescadores Ils	Apr, 1897	Do.
	36552	1 ' '	Okinawa shima		Sci. Coll., Tokyo.
Do	26a-c	=au+ /		Sept. —, 1896	T. Tada.
d. Coll., Tokyo			Taipa, Formosa	верт. —, 1896 Пост. —, 1896	Do.
	25a-g	- * * * * * * * * * * * *			1
Do	27a-k	*****		May -,1897	Do.
Do	28a-d		Pescadores Is	Apr. —, 1897	Do.

<sup>Description, p. 129.
Description, p. 128.
8ci. Coll. No. 26, figs. 107-110.</sup>

⁴ Sci. Coll. No. 25. 4 Sci. Coll. No. 27.

[/] Sci. Coll. No. 28. # Sci. Coll. No. A. 1.

RANA SWINHOANA« Boulenger.

1903. Rana swinhoana BOULENGER, Ann. Mag. Nat. Hist. (7), XII, Nov., 1903, p. 556 (type-locality, Bangkimtsing, Formosa; types, Brit. Mus. Nos. 99, 4, 24, 104–105; J. D. La Touche, collector).

Description of types. Female. Vomerine teeth in two oblique series between the choana: head much depressed, slightly broader than long; snout as long as the diameter of the orbit, rounded; canthus rostralis obtuse; loreal region not very oblique, concave; nostril equally distant from the end of the snout and from the eye; interorbital space as broad as the upper eyelid; tympanum distinct, one-half to three-fifths the diameter of the eye; fingers moderate, first not extending beyond second; toes entirely webbed; tips of fingers and toes dilated into well-developed disks, which are much smaller than the tympanum; subarticular tubercles rather small; a small, oval inner metatarsal tubercle; the tibio-tarsal articulation reaches the tip of the snout; skin smooth, granular on the side; no dorso-lateral fold. Brown above, with small darker spots; a dark canthal streak and a dark temporal blotch; a whitish streak on the upper lip; limbs with rather indistinct dark crossbars; lower parts white.

Diversions. From shout to vent 80 mm. Boulenger's original description.

Remarks. Doctor Boulenger states that the nearest ally to this species is R and R if R Blyth R of lowerest Guenther , the range of which extends from Darpeeling, in the Himalayas, through the mountains of Assam and Tenasserim to Hengkong

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RANA ISHIKAWÆ Steineger

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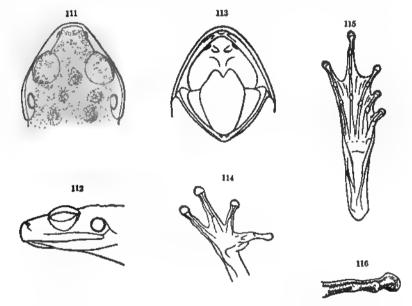
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well marked; lores concave; interorbital space slightly wider than upper eyelid; tympanum one-half the diameter of eye and scarcely more than its distance from the latter; fingers free, first extending beyond second almost the length of the disk, and with smooth swelling at base; disks large, about two-thirds the diameter of tympanum, rounded anteriorly; toes moderately webbed, two distal phalanges of fourth toe being free and the excision of the web reaching to the distal third of the basal phalanx of the same toe; subarticular tubercles prominent; a flat, weak, inner metatarsal tubercle, less than one-half the length of the first toe measured from the tubercle; no outer tubercle; a tarsal fold; specimen too hardened to be unbent or legs stretched out, but tibio-tarsal articulation would probably reach



Figs. 111-116.—Rana issikawæ. $\frac{1}{4}$ × nat size. 111, top of read, 112, side of read, 113, open moute; 114, underside of hand; 115, underside of pout ($\frac{1}{4}$ × nat. size), 1; 116, tip of digit. No. 30, Imp. Mus Tokyo.

between eye and tip of snout; tibio-tarsal articulations of bent hind legs overlapping slightly; skin of upper surface exceedingly rough, even on upper eyelids and sides of face, the tubercles assuming a very extraordinary pattern caused by the smaller tubercles surrounding concentrically a number of large round pustules which are wrinkled radially from the central prominence; sides very roughly studded with closely set, large, wrinkled tubercles; underside finely granular, except posterior aspect of femur, which is coarsely so. Color (in alcohol) above brownish, a network of chocolate brown surrounding the large insular tubercles, which are ochraceous-buff, with the central prominence darker brown; lips pale, blotched with

dark brown; limbs crossbarred with dark brown and drab; upper posterior aspect of femur mottled with the same colors; underside pale russet, with a network of obscure whitish mottlings.

Dimensions.

	mm.
Total length, tip of snout to vent (approximately 4)	115
Width of head	40
Distance between nostrils	10
Distance between nostril and eye	8.5
Diameter of eye	12
Diameter of tympanum	6
Interorbital space	61
Width of upper eyelid	9
Fore leg a	61
Largest finger disk	4
Hind leg, vent to tip of longest toe a	178
Tibia	53
Inner metatarsal tubercle	5. 5

Remarks.—This large species is easily recognized by its very peculiar pattern of glandular pustules on the back, which is still more enhanced by the coloration, emphasizing the odd arrangement which suggests a map of the moon, only that there are no craters visible on the top of the volcanoes.

Habitat.—The only specimen thus far known is the type in the Imperial Museum, Uyeno Park, Tokyo, which is said to have come from Okinawa shima.

List of specimens of Rana ishikawa.

					
Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected.
-					· ——— — — —
Imp. Mus. Tokyo	30	(0)	Okinawa shima		

a Type; description, p. 132; figs. 111-116.

RANA NARINA b Stejneger.

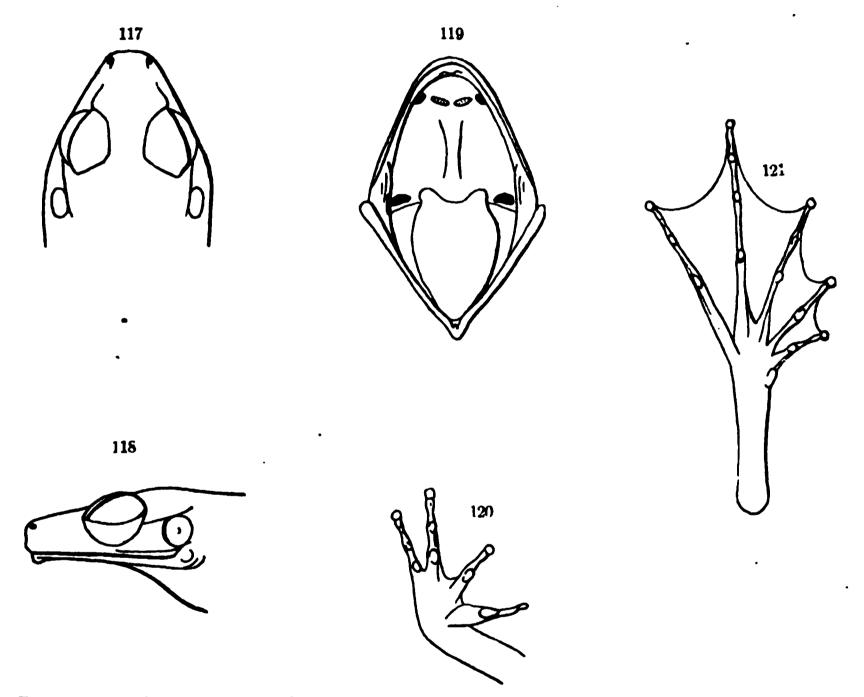
1901. Rana narina Stejneger, Proc. Biol. Soc. Washington, XIV, Dec. 12, 1901, p. 189 (type-locality, Okinawa shima, Riu Kiu; type, Sci. Coll. Mus. Tokyo, No. 19a).

Description of type specimen.—Adult: Science College Museum, Tokyo, No. 19a; Okinawa shima (figs. 117-121). Vomerine teeth in two distinct, nearly transverse series, which do not extend beyond a line between the posterior margin of the choana; the distance between the series a little less than between the latter and the choana, which are very large; head longer than wide; snout long, nearly squarish

a The specimen has the back very much bent and is so hardened that it can not be stretched out to its normal length. For the same reason the legs can not be unbent and their measurements are, therefore, also approximate only.

b Having reference to the nostrils, narcs, tof their extreme forward position in this species.

truncate, vertical, the nostrils being situated near the outer extremity, their distance from edge of lip being about one-half their distance from the eyes; lores subvertical, very concave; eyes large; interorbital space narrower than upper eyelids; tympanum very distinct, its diameter about one-half the diameter of the orbit, its distance from the orbit being more than one-half its diameter; several large glandular warts behind the angle of the mouth; fingers rather long, first extending beyond second; terminal disks distinct, but small, much smaller than tympanum; subarticular tubercles large; toes broadly webbed, reaching to the disks of the third and fifth toes; disks about the size of those of the fingers; subarticular tubercles strong; inner



Figs. 117-121.—Rana narina. Nat. size. 117, top of head; 118, side of head; 119, open mouth 120, underside of hand; 121, underside of foot. No. 19a, Sci. Coll. Tokyo.

metatarsal tubercle but slightly prominent, narrow, less than one-half the length of the inner toe; no outer metatarsal tubercle; fore limbs longer than tibia; tibio-tarsal joint extends considerably beyond the snout; heels overlap considerably when thighs are bent at right angles to the axis of the body; no dorsal or dorso-lateral folds; no tarsal fold; both surfaces smooth. Color (in alcohol) above brownish, below whitish; a narrow whitish line from under the eye to and including the postoral glands; sides and posterior surface of thighs coarsely marbled with dark brown; chin and throat clouded with dusky. The specimen appears to have faded considerably, so that the description of the coloration is probably very defective.

Dimensions.

	
From snout to vent	66
From snout to corner of mouth	22
Length of head	22
Width of head	21
Diameter of eye	7
Width of upper eyelid	6
Interorbital width	5
From eye to nostril	7
From nostril to edge of lip	3. 5
From eye to end of snout	8
Diameter of tympanum	4
From eye to tympanum	2.7
From snout to fore limb:	23
Fore limb	43
	120 .
Tibia	38
Foot	51

Remarks.—I know of no species to which the present one is particularly closely allied. In some respects it appears to resemble R. everetti Boulenger, from the Philippines, particularly in the position of the nostrils, but in detail there are more differences than similarities. The forward position of the nostrils in R. everetti is even exceeded in our species, and the vomerine teeth, digital disks, length of hind limb, etc., are totally different.

Habitat.—Only known from the unique type specimen which hails from Okinawa shima, Riu Kiu.

List of specimens of Rana narina.

Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected.
			Okinawa shima, Riu Kiu		
			· -		

a Type: description p. 134; figs. 117-121.

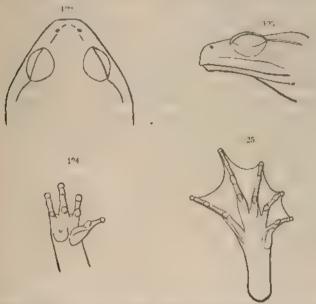
RANA NAMIYEI 11 Stejneger.

1901. Rana nanciyci Stejneger, Proc. Biol. Soc. Washington, XIV, Dec. 12, 1901. p. 190 type-locality. Okinawa shima. Riu Kiu; type, Sci. Coll. Mus. Tokyo. No. 31x).

Description.—Adult: Science College Museum. No. 31A; Okinawa shima, Riu Kiu (Figs. 122-126).—Vomerine teeth in two b rather large, very distinct, and very oblique series, the anterior end on a level with the posterior border of the choana, the distance from the latter being about one-half that between the posterior ends of the vomerines; lower jaw with two greatly developed tooth-like prominences in front, fitting into two deep pits in the upper jaw; head very large,

a Named for Mr. M. Namiye, of the Science College, Imperial University. Tokyo. b The right one lost in this specimen.

its width at the angle of mouth equals the distance from snout to insertion of fore limb; snout short, truncate, without canthus ros-



Figs 122-125. Rana namive: { nat size | 22 top of head, 123, side of head, 124, underside of hand, .25 underside of foot | No 3, a Sci Coll Tokyo.

tralis; nostril situated half way between eye and median point of upper lip; eyes directed upward, interorbital space one and one half times

as wide as upper eyelid, tympanum hidden; fingers short, slightly dilated at tip, the second one more so than the others, subarticular tubercles well developed; second finger extending considerably beyond first, and falling a trifle short of fourth, which reaches to the penultimate phalanx of third; toes broadly webbed to the tip of the toes, which are somewhat dilated; fourth toe about one-third longer than fifth, which extends only to the middle of third phalanx from the tip of the former, third reaching to the base of the penultr



FIG. 126 RANA NAMIYEL NAT SIZE OLEN MODTH NO. 31A, but Cold Tokyo

mate phalanx; subarticular tubercles well developed, single; inner metatarsal tubercle prominent, with a free outer edge, the width

contained two and one-half times in the length, which about equals the diameter of the eye; no outer tubercle; a well-developed membranaceous fold along the outer edge of the fifth toe; a tarsal fold; the tibio-tarsal joint does not reach the eye; the heels do not meet by a distance greater than the diameter of the eye when the hind limbs are bent at right angles to the axis of the body; skin above nearly smooth, very loose, and apparently transversely wrinkled; a well-marked fold from posterior corner of eye to above fore limb and another less distinct from under the eye backward parallel with the former. Color above brown, with a broad dark band between and including the posterior half of the upper eyelids, with the faintest trace of a lighter band in front of it; lower surface whitish, clouded with dusky, especially on the throat and chin.

Dimensions.

	766 775
From snout to vent	. 116
From snout to corner of mouth	. 40
Width of head	. 53
Diameter of eye	. 9
Width of upper eyelid	
Interorbital width	. 12
From eye to nostril	
From eye to end of snout	
From snout to fore limb	
Fore limb.	. 62
Hind limb	. 138
Tibia	. 45
Foot	. 60
Inner toe	. 12
Inner metatarsal tubercle	. 9

Variation.—Another large specimen is in the Science College Museum, collected by Mr. S. Ungawa in Okinawa shima. It has numerous longitudinal tubercular ridges, and the skin is transversely wrinkled on the posterior part of the back only. The interocular light band is very pronounced.

A much smaller specimen in the same museum (No. 18), also from Okinawa shima, and collected by Mr. Nakagawa, differs chiefly in having the head proportionally less broad, the bony tubercles on the mandible less developed, vomerines placed a little more forward, tympanum pretty well defined, and first finger slightly extending beyond second. The skin of the back, eyelids, and thighs is strongly rugose with warts more or less connected by longitudinal ridges; no transverse plaiting. Upper lips with large blackish spots; transverse dark band between eyes very distinct, the light one less so.

At this age it resembles distantly some specimens of R. tigerina, from which it differs, however, in most essential points. Thus the nostrils are placed more forward; the interorbital space is much broader;

the vomerine series much shorter and more anterior; shorter tibia; larger inner metatarsal tubercle, etc., not to mention the different coloration.

Remarks. -This species is evidently most nearly related to R. corrugata, from Ceylon, and R. kuhlii, from southern China and the Malay archipelago, but it shows marked differences from both. From R. kuhlii it is easily distinguished by the much longer fifth toe, while it differs from R. corrugata in the much larger metatarsal tubercle and the large and prominent groups of vomerine teeth.

Habitat. -Thus far only known from Okinawa shima, Riu Kiu, from which island I have examined three specimens.

List of specimens of Rana namiyei

Museum	No	Age	Locality	When collected	By whom collected.
Set Coll Tokyo	31A	Adulta	Okinawa shima, Riu Kiu		*
Do		16 b	do		S I ngawa.
Do	18	lintigt b	do		Nakagawa
- D.			10m G. 120 100	A Daniel street	- 100

ne description, p. 136; figs 122-126

h Description p 138.

RANA TIGERINA a Daudin.

1803 Rana tigerina Dai ots, Hist Nat Rain, fol ed., p 42, quarto ed. cp 64), pl xx (type-locality, Bengal type in Mus Paris, Massé, collector), Hist Nat Rept. VIII 1803 p 125

1820 Rana tigrina Merrem, Tent. Syst. Amphib. (p. 174) (emendation) —Hattowell Proc. Phila. Acad., 1860, p. 504 (Hongkong). Boulenger Cat. Batr. Sal. Brit. Mus., 1882, p. 26. East Indies, Shanghai, Ningpo, China, Formosa). -Parenti and Picaglia. Atti Soc. Natural. Modena, Mem. (3) V. 1886, p. 90. Hongkong market).

1835 Rana cittigera Wiegmann, Nova Acta Acad Leop Carol, XVII, Pt. 1 p. 255, pl. xxi fig. Litype localities, Laguna del Bay, Luzen, Philippine Islands, and Macao, China; Meyen, collector)

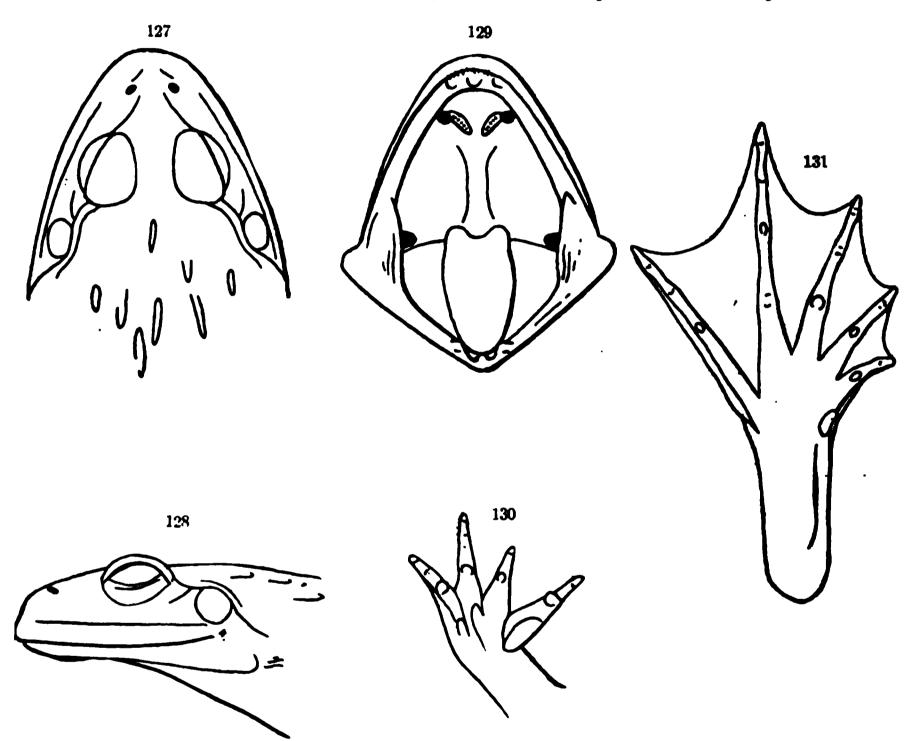
1835 Rana rugulosa Wielmann, Nova Acta Acad Leop Carol XVII, Pt. 1, p. 258 pl. xxi, fig. 2 type-locality Cape Syng-more, China, Meyen, collector)

Several other names, in the synomymics credited to this species, are omitted here as they may be applicable to possible subspecies.

Description (figs. 127-131). Adult female; British Museum, No. 68. 1. 27. 24; Formosa; Doctor Collingwood, collector. Vomerine teeth in two very large oblique series, their anterior border on a level with the anterior border of the choanse, contiguous with the latter and nearly meeting on the median line; lower jaw with two fairly well-developed tooth-like prominences in front, fitting into pits in the upper jaw; width of head at angle of mouth equaling the distance between tip of snout and insertion of fore leg; snout rather short and rounded without canthus rostralis; nostrals situated about

a Careless form for tigrinus, spotted or barred like a tiger tigris.

halfway between eye and tip of snout; interorbital space much narrower than upper eyelid; tympanum distinct, about three-fourths the diameter of the eye; fingers tapering, not dilated at tips; second finger shorter than first, about equaling fourth; toes nearly entirely webbed, not dilated at tips; a rather wide flap of skin bordering the outer side of the fifth toe, the flap being particularly wide along the metatarsal bone; subarticular tubercles moderate; inner metatarsal tubercle small, its length scarcely one-half the diameter of the eye; no outer tubercle; a tarsal fold; tibio-tarsal joints reach eyes when



Figs. 127-131. Rana tigerina. Nat. size. 127, top of head; 128, side of head; 129, open mouth; 130, underside of hand; 131, underside of foot. No. 7435, U.S.N.M.

hind legs are stretched forward along the side and meet when bent at right angles to the axis of the body; skin above with numerous, very distinct, longitudinal, short, glandular ridges, but no transverse fold, and no dorso-lateral fold; a well-marked fold from posterior corner of eye around upper edge of tympanum to above fore leg. Color brown above with numerous roundish dark spots; no vertebral light line; lower surface whitish with brownish marblings on throat and chest; thighs strongly marbled with dark brownish.

Dimensions.

Total length, tip of snout to vent	88
Width of head	32
Snout to corner of mouth	30
Diameter of eye	8
Diameter of tympanum	6
Width of upper eyelid	8
Width of interorbital space	5
Eye to nostril	8
Eye to tip of snout	14.5
Snout to fore leg	34
Fore leg	46
Tibia	39
Inner metatarsal tubercle	4

The adult male (U.S.N.M. No. 34392; northern Formosa) differs chiefly in the presence of copulatory excrescences on the side of the first finger, which is somewhat swollen at base, and by the two large external vocal sacs, located one on each side of the throat.

The tadpoles of this species have been described and figured by Mr. Stanley S. Flower from Siamese specimens.^a His description, drawn up from specimens obtained in June, 1897, at Ayuthia, Siam, is herewith given in full.

Length of body once and a half its width, rather more than half length of tail; nostrils a little nearer to the eyes than to the end of the snout; eyes on the upper surface of the body, nearer the end of the snout than the spiraculum, the distance between the eyes twice the distance between the nostrils, and about equal to the width of the mouth; spiraculum on the left side, directed backward and upward, a little nearer the anus than the end of the snout, visible from above and from below; anus opening on the right side. Tail from three and one-half to four times as long as deep; acutely pointed; upper crest convex, a little deeper than the lower, not extending on to the back; depth of the muscular portion at its base about half the greatest total depth. Mouth: the large powerful beak is entirely black; the upper mandible terminates in front in a long sharp toothlike prominence; the lower mandible is bicuspid, each "tooth" being long and sharp; the lips are bordered with very short fleshy papillæ; inside the upper lip are five series of fine, black teeth; the first series is uninterrupted by the individual teeth being "grouped with intervals" about the center of the line; the remaining series are broadly interrupted, the fifth being very short and difficult to distinguish; the lower lip has also five series of teeth; the first is short and uninterrupted, the second long and uninterrupted, the remainder broadly interrupted and very short. Color (in life), above yellowish brown, mottled with darker brown, a very distinct dark brown crescent-

a Proc. Zool. Soc. London, 1899, pp. 892-893, pl. Lix, figs. 2-2a.

shaped mark above each nostril; below white, purplish gray about the chin and throat; tail yellow, mottled with brown, a horizontal dark line along the median line of the basal third of the muscular portion; iris golden. Total length 52 mm.; length of body 18.5; width of body 12.5; length of tail 33.5; depth of tail 9.

Variation.—This is the largest species of frog in that part of the world which is included in the present work. The female described above is small. Another Formosan specimen in our collection (U.S.N.M. No. 34390), measures 131 mm. from snout to vent, and specimens from other localities as large as 165 mm. are on record. The males are smaller, our largest from Formosa (U.S.N.M. No. 34392) measuring only 94 mm. in total length. The hind legs appear also to be shorter, inasmuch as the tibio-tarsal articulation does not reach even the tympanum. The ground color in our specimens is not brownish but olive, and the color in life is probably some shade of the latter tint.

Remarks.—Specimens from Borneo, which I had the privilege of examining in British Museum, have the vomerine groups of teeth more oblique and separated from the choanæ by a space fully equal to that between the two patches. I can not, therefore, agree in regarding Rana schlueteri Werner as a synonym. Chinese specimens in our museum (U.S.N.M. No. 7435; Hongkong; W. Stimpson, collector) agree with the Formosan specimens as described.

Habitat.—Widely distributed from India and Ceylon through Burma and Pegu to the Malay peninsula and archipelago,^a Celebes, and the Philippine Islands; eastward it extends into southern China, where it occurs as far as Ningpo and Shanghai.

Its occurrence in Formosa is attested by four female specimens in British Museum, collected at various times by Swinhoe, Dickson, and Collingwood, and by three specimens, male and female, in the United States National Museum from northern Formosa, obtained through Mr. A. Owston.

1 :01	•	ns of Rana	tivenina
Last of	SDECIMA	ns of Kana	nacrina.

Museum.	No	Sev.	Locality.	When collected.	By whom collected or from whom received.
U.S.N.M	7435	(it	Hongkong, China		W. Stimpson.
Do	34390	Female .		sa May - ,1903	
Do	34391	Male	do	do	Do.
Do .	34392	do 5	do	do	Do.
Brit Mus	68 1 27 24	Female ·	Formosa		Doctor Collingwood.
Do	68 1 27 25	do	do		Do.
o Figs. 123	7-131.		в Г. 141.	· 1)	Description, p. 139.

a Note, however, the observations made above under the heading of "Remarks."

Genus POLYPEDATES" Tschudi.

1838. Rhacophorus Tschi ot, Classif. Batr., pp. 32, 73 (type, R. reinwardin; not of Schlegel 1827).

1838 Theloderma Tseni Di, Classif Batt, pp. 32, 73 (type, T. leprosa).

1838 Buergeria Tschupi, Classif Batr., pp. 34, 75 (type: Hyla buergeri Schlegel).

1838 Polypedotes Tscht Dr. Classif Batr. p 34 Type, P lencomystax)

1838 Polypedules Tseni di, Classif Bair., p. 75 (correction).

1843 Teachyhyas Fitzinger, Syst. Rept., p. 31 (type, Polypedates rugosus=P. lencomystar).

1848. Dendricus Gister, Natury. Thierr., p. viii (substitute for Buergerie).

1890 Polypedetes Cours Century Dictionary, IV, p. 4606 (emendation,

Authors who reject Fitzinger's generic names of 1843 as nomina nuda, in spite of the fact that they are accompanied by an explicit statement of type, are not always consistent, as for instance in the present case.

In Oken's Isis for 1827 Schlegel made a number of perfunctory remarks about various herpetological matters, in which he mentioned several manuscript names of genera instituted by Kuhl or H. Boie. Among these is also *Rhacophorus*, which is introduced (p. 294) in the following words:

"Nach Hyla reiht Kuhl sein neues Geschlecht: Racophorus ein. Sp.: Rac. reinwardtii Kuhl n. sp., palmatus Kuhl (Hyla Daud.), moschatus Kuhl n. sp., und noch zwey unbenannte Species vom Herra Professor Reinwardt mutgebracht"

That is all. A generic name without the slightest trace of a definition or description accompanied by three specific names, two of which are nomina nuda, as one (R reinwardti) was only described many years after, the other (R. moschatus) apparently never. Only one of the species mentioned could be recognized when the generic name was published, viz, Daudin's Hyla palmata, which of necessity must be the type. And as this species is a typical Hyla, Racophorus of 1827 becomes a synonym of this genus. Any other result is preposterous, for certainly a generic name without diagnosis to be tenable can not well have for type an undescribed species b. And yet Rhacophorus is accepted by those who even refuse to quote Fitzinger's genera in the synonymy. Even the rehabilitated Rhacophorus of Tschudi (1838) is not in a much better position, since the species assigned to it were not described even then, as the part of Schlegel's "Abbildungen" containing the first description of Rhacophorus reinwardti was published after Tschudi's work 'appeared, but it is plainly untenable in view of the different application of the name in 1827,

[·] From πολύ much, πηδάω, Ιρμπρ

b That the genus Rhacophorus was unterstood in this sense by herpetologists before Tschude's time is shown by van der Houvens use of Racophorus in 1833 (Handb, Dierk , H. Pt. 2, p. 311, for Hyla palmata, faber and crepitans,

CTschudi, Classif Batr., p. 32.

I have not alluded to Kuhl's own application of *Rhacophorus* in 1822,^a because it was certainly unidentifiable at the time. He refers, it is true, to the dermal flap at the heel,^b but in so uncertain a way that the genus without reference to a described or figured species (and no species was described until twenty-five years afterwards) must have been completely unintelligible. The fact that we know now what he meant is not sufficient.

Polypedates, or Polypedotes, Buergeria, and Theloderma were proposed by Tschudi simultaneously for two different species of the same genus, Theloderma being mentioned first. Duméril and Bibron, however, in 1841, in combining the first two genera, selected Polypedates for the greater group, and Guenther, in 1887, merged Theloderma in Polypedates, hence this name must be adopted according to article 28 of the International Zoological Code of Nomenclature.

The genus *Polypedates*, as here understood, differs from the genus *Rana* chiefly in the presence of a small bone intercalated between the last phalanx of the digit and the normally penultimate one. Externally this arrangement is marked on the upper surface by a kink or notch just before the widening of the disk, thus rendering dissection in most cases unnecessary. However, it is much safer to dissect, as shown by the erroneous reference of *Rana ijimæ* and *Rana ishikawæ* to the present genus.

KEY TO THE JAPANESE AND FORMOSAN SPECIES OF POLYPEDATES.

- a 1 Fingers considerably webbed; color above green (blue or purplish in alcohol), immaculate.

 - b^2 No outer metatarsal tubercle; dermal margin of fingers equaling the bone in width.
- a² Fingers free, or with only a rudiment of web at base; color above brownish, more or less marked with darker.
 - b^{-1} Tibia about one-half the length of head and body.
 - b² Tibia more than one-half the length of head and body.

a Isis, 1822, p. 476.

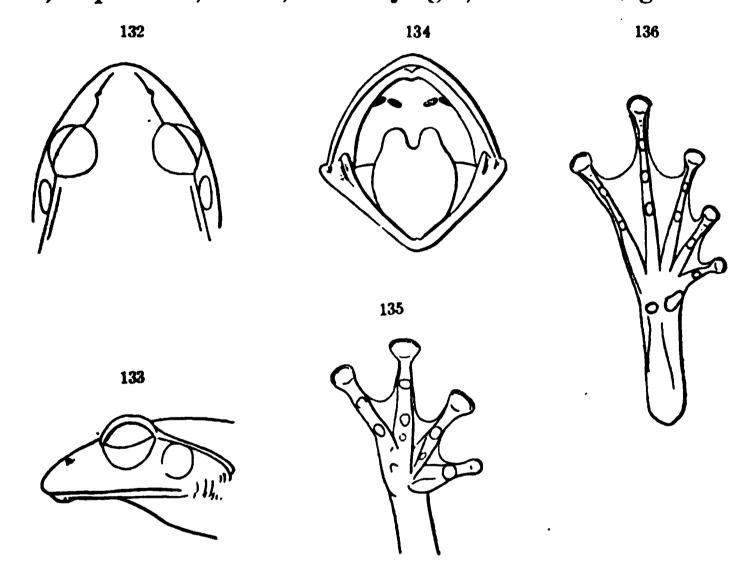
b This dermal heel flap is also found in *Hyla palmata*, and consequently is not diagnostic. As a matter of fact, the latter species being the only one known at the time, the genus was at first restricted in the shown above.

POLYPEDATES SCHLEGELIIa Guenther.

1858. Polypedates schlegelii Guenther, Cat. Batr. Sal. Brit. Mus., p. 81, pl. vi, fig. c (type-locality, Japan; types in Brit. Mus.).—Martens, Preuss. Exped. Ost-Asien, Zool., I, 1866, p. 111; 1876, p. 383 (Yokohama).—Hilgendorf, Sitz. Ber. Ges. Naturf. Fr. Berlin, 1880, p. 120 (Tokyo; Tsukuba Mt., Hitatchi Prov.).—Rhacophorus schlegelii Boulenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 86, pl. ix. fig. 1 (Japan).—Okada, Cat. Vert. Japan, 1891, p. 67 (Aizu, prov. Iwashiro; Tadam; Tokyo).—Racophorus schlegelii Ikeda, Annot. Zool. Jap., I, Pt. 3, Aug. 1897, p. 113 (Aizu, prov. Iwashiro; Tokyo; breeding habits).

1892. Rhacophorus schlegeli Boettger, Kat. Batr. Mus. Senckenberg., p. 16 (Hakone Mts.; Yokohama).

Description.—Adult female; U.S.N.M. No. 23589; Yokohama, Hondo; September, 1896; L. Stejneger, collector (figs. 132-136).



Figs. 132-136.—Polypedates schlegelii. 1\(\frac{1}{2}\times nat.\) size. 132, top of head; 133, side of head; 134, open mouth; 135, underside of hand; 136, underside of foot. No. 23589, U.S.N.M.

Vomerine teeth in two nearly straight series between and close to the choanse, each series shorter than the distance between them; snout declivous; nostrils slightly nearer the eye than the tip of snout; interorbital space more than one and a half times the width of upper eyelid; tympanum circular, about two-thirds the diameter of the eye; fingers webbed, between third and fourth to distal end of basal phalanx, the others at base only; first finger much shorter than second, not even reaching the disk of the latter; disks of second, third, and fourth fingers large, about three-fourth the diameter of the tympanum, that of

^{**}Named in honor of Dr. Hermann Schlegel, director of the Rijksmuseum at Leiden, and the chief author of the herpetological portion of "Fauna Japonica." Born, January 19, 1804, in Altenburg, Germany; died in Leiden, January 17, 1884.

the first small, all slightly rounded anteriorly; toes nearly entirely webbed; disks large, but smaller than those of fingers, gradually decreasing in size from fourth toe; a pear-shaped inner metatarsal tubercle, as large as one-half the first toe, rounded; a large, but not prominent outer one; tibio-tarsal articulations reach posterior border of eye, and do not meet when hind legs are placed vertical to the axis of the body; skin above very finely shagreened; no dorso-lateral folds; a strong fold from posterior border of eye over tympanum to shoulder; skin on underside granulated, the granulation increasing in coarseness from the throat backward. Color above in life green, in alcohol dull marine blue; beneath yellowish, as are also the upper surface of the two inner fingers, the three inner toes, and disks of all the digits; a few dusky spots on posterior aspect of femur; no cross-bars on legs.

Dimensions.

	mm.
Total length, tip of snout to vent 4	
Width of head 1	.8
Interorbital space	6
Upper eyelid	3.5
Diameter of eye	5
Diameter of tympanum	3.3
Diameter of largest finger disk	3
Fore leg	
Hind leg, vent to tip of largest toe 6	
Tibia	

Variation.—There is apparently very little external difference between the sexes. The male is said to have an internal vocal sac, and No. 34373, a May specimen, has the throat suffused with dark gray, which the others collected in the same locality and at the same time do not.

There is some variation in the length of the vomerine series, so that the internal is not often so great as in the specimen described. The tympanum is often smaller and the declivity of the snout is not always equally great.

Habitat.—This species is apparently confined to Japan. Thus far it is only recorded from Kiusiu (Miyazaki, U. S. Nat. Mus.) and Hondo as far north as 37° N. L. (Aizu, prov. Iwashiro, according to Okada). It is not uncommon in the woods near Yokohama (von Martens, Boettger, Stejneger) and Tokyo (Hilgendorf, Okada). Hilgendorf also records it from the Tsukuba Mountain, northeast of Tokyo in the province of Hitatchi, while Boettger has it from the mountains near Hakone. We also have four specimens from Mount Fuji, and in the Stockholm Museum there is one specimen collected by Dr. O. Nordquist at Enoshima. It is not found in Yezo, and is replaced in the Riu Kius by the next form.

Museum.	No.	Sex and age.	Locality.	When collected.		By whom collected or from whom received.
U.S.N.M	23589	Female a	Yokohama, Hondo	Sept.,	1896	L. Stejneger.
Do	23590	do	do	do.		Do.
Do	23591	do	do	do.	.	Do.
Do	30741	Halfgrown	Miyazaki, Kiuslu			C. A. Clark.
Do	34370	Male	Mount Fuji, Hondo	May,	1898	A. Owston.
Do	34371	do	do	d o.		Do.
Do	34372	do b	do	do.		Do.
Do	34373	[do	do	do.		Do.
Leiden	c 1694		Japan			v. Siebold.

List of specimens of Polypedates schlegelii.

POLYPEDATES VIRIDIS a Hallowell.

1860. Polypedates viridis Hallowell, Proc. Phila. Acad., 1860, p. 500 (type-locality, Okinawa shima, Riu Kiu; type, U.S.N.M. No. 25397; W. Stimpson, collector). Rhacophorus viridis Boulenger, Proc. Zool. Soc. London, 1887, p. 149 ("Loo Choo Islands;" Pryer collection).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 865; author's separate, p. 16 (Okinawa shima).— BOETTGER, Offenbach. Ver. Naturk. 33-36 Ber., 1895, p. 106 (Okinawa shima).—Brown, Proc. Phila. Acad., 1902, June 11, p. 185 ("Loo Choo Islands," probably Okinawa shima; Furness and Hiller, collectors).

The relationship of this form to P. schlegelii is very close indeed, so close that all my attempts to draw a hard and fast line based upon differences in proportion between hind legs and total length, distance of nostrils from eye, relative size of tympanum and large finger disks, etc., have failed in a large series. It seems, however, that the narrowness of the dermal margin of the digits in the northern form is a fairly good characteristic, inasmuch as the fingers appear slenderer and the disks consequently more differentiated, though in reality they are relatively smaller than in the southern forms. It is also possible that a larger series of the Okinawa form would show it to have slightly longer hind limbs, although in the only specimen before me the tibia is less than half the total length, notwithstanding the fact that the specimen is very much hardened, with the back bent at nearly 60 de-This specimen has also a very weak inner metatarsal tubercle, and the outer one is scarcely noticeable, and as Boulenger has also commented upon the smallness and flatness of the former in the specimen examined by him, it may be that we here have an additional character.

Under these circumstances it is unnecessary to submit a detailed description of this form, but a set of measurements of Science College

Description, p. 145; figs. 132–136. b P. 146.

c About 10 specimens.

a Latin word, signifying green.

Dimensions.

	THTM.	
Total length, tip of snout to vent	. 65	
Width of head	. 23	
Interorbital space	. 7.5)
Upper eyelid		
Diameter of eye		
Diameter of tympanum		
Diameter of largest finger disk	. 5	
Fore leg		
Hind leg, vent to tip of longest toe		
Tibia	. 27	

Habitat.—Thus far found only on the southern group of the Riu Kius. The United States National Museum has a fine series from Ishigaki shima. The specimen collected by Doctor Warburg, in 1891, in Miyako shima, and now in the Hamburg Museum (No. 534) belongs probably to the present form.

List of specimens of Polypedates owstoni.

U. S. N. M. No.	Sex.	Locality. Wh	By whom collected or from whom received.
4330	Adult	Ishigaki shima, Riu Kiu	A. Owston.
4331	do	do	Do.
332	do	'do	Do.
1333	Female a	do	Do.
334	Adult	['] do _.	Do.
335	do	do	Do.
133 6	Male	do	Do.
337	Adult	do	Do.
338	do	[.] do	Do.
339	do	'do	Do.
340 ,	do	[°] do	Do.
341	do	do,	Do.
342	do	do	Do.
343	do	do	Do.
344	do	do	Do.
345	do	do	Do.
134 6	!do	[.] do	Do.
1347	do	['] do	Do.
1348	do	ldo	Do.
1349	do	do	Do.

a Type.

POLYPEDATES BUERGERIa (Schlegel).

Plate XII.

1838. Hyla buergeri Schlegel, Fauna Japon. Rept., p. 113, Sauri. et Batr., pl. m, figs. 7-8 b (type-locality, Japan; types in Leiden Mus.; Buerger, collector).—Schlegel, Abbild. Amph., 1844, p. 140, pl. l., fig. 5 (Japan; colored

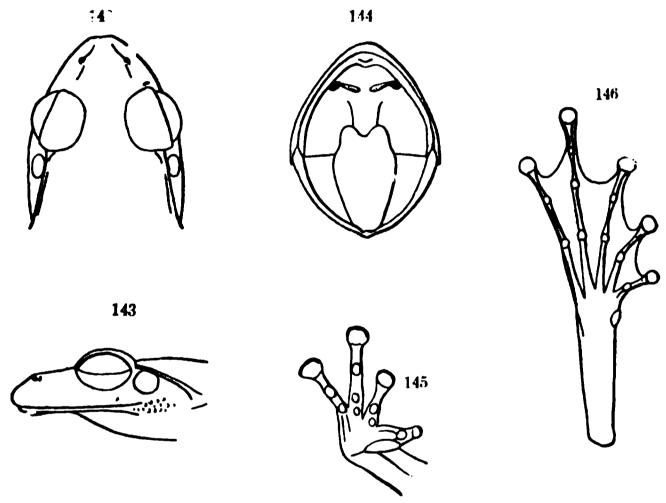
^aTo Doctor Buerger, the companion and successor of von Siebold in the exploration of the fauna of Japan.

b Reproduced in this work on Plate XII.

original sent by Buerger).—Boettger, Offenbach. Ver. Naturk. 17-18 Ber., 1878, p. 8 (Japan).—Polypedates buergeri Dumèril and Bibron, Erpét. Gén., VIII, 1841, p. 521 (Japan).—Guenther, Cat. Batr. Sal. Brit. Mus., 1858, p. 80 (Japan).—Rana buergeri Boulenger, Cat. Batr. Sal. Brit. Mus., 1882, p. 73 (Japan); Proc. Zool. Soc. London, 1886, p. 412 (Japan).—Okada, Cat. Vert. Japan, 1891, p. 67 (Hakone, Musashi, Nikko, etc.).—Boettger, Kat. Batr. Mus. Senckenberg., 1892, p. 13 (Japan).—Krefft, Verh. Ges. Deutsch. Naturf. Aerzte, 69 Vers., Braunschw., 1897, II, Pt. 1, 1898, p. 187 (habits).—Rhacophorus buergeri Boulenger, Proc. Zool. Soc. London, 1888, p. 205.

1838. Buergeria subversicolor Tschudi, Classif. Batr., pp. 34, 75 (Japan; substitute name for buergeri).

Description (figs. 142-146).—Adult female; U.S.N.M. No. 31904; Kochi, Tosa, Shikoku: May 11, 1903; Dr. II. M. Smith, collector.



Figs. 142-146.—Polypedates buergeri. 1½ × nat. size: 142, top of head; 143, side of head; 144, open mouth; 145, underside of hand; 146, underside of foot. No. 23904, U.S.N.M.

Vomerine teeth in two long, nearly straight series between the choanæ, starting at the inner front corner of the latter, and separated from each other by an interspace less than the length of a series; nostril nearer the tip of snout than the eye; interorbital space about equaling the width of the eye; tympanum about one-half the diameter of the eye; fingers prefectly free; first finger much shorter than second, which falls considerably short of fourth; disks of third and fourth finger large, as large as tympanum, of second and first successively smaller; toes fully webbed; largest disks of toes equaling in size disk of second finger; subarticular tubercles strong; inner metatarsal tubercle small, weak, slightly projecting; no outer tubercle; tibio-tarsal articulations reach center of eye and overlap slightly when hind legs are placed at right angles to axis of body; skin above, including eyelids, snout, sides of face, and upper surface of limbs warty; underside nearly

smooth except lower belly and basal portion of posterior aspect of femur granular. Color (in alcohol) above dull brownish gray with obscure dark spots which become sharply defined and blackish on the sides and hind legs; a chevron mark of dusky on the upper eyelids and interorbital space, the convexity pointing backward, and two longitudinal curved lines between the shoulders with their convexity toward the median line; legs crossbarred and marbled with blackish; upper posterior aspect of femur marbled with black; underside whitish, lower lips and adjacent portions of throat, as well as lower portions of the thigh and the tibia, with numerous small black spots.

Dimensions.

•	
Total length, tip of snout to vent	70
Width of head	24
Fore leg	42
Hind leg, vent to tip of longest toe	
Tibia	

The adult male is apparently much smaller, U.S.N.M. No. 31906, same locality, date, and collector, measuring only 45 mm. in total length. The hind legs are much longer, as the tibio-tarsal joint reaches the nostril, and the tibia is slightly longer than half the total length, viz. 23.5 mm. There is a large swelling at the base of the first finger, with a pad of copulatory asperities, as in the Ranas, covering the side of the metacarpal and the basal phalanx. There is also an internal vocal sac with an opening in the mouth on either side of the tongue. The coloration is essentially as in the female, only the dusky spots on the throat are much smaller and much more numerous.

Variation.—Our series is rather uniform, showing but little variation, except that there is a great deal of difference in the amount of dark markings on the underside, the above descriptions representing the maximum.

Habitat.—None of the records thus far published, except Okada's Catalogue, gives any definite localities for this strictly Japanese species. The original types collected by Buerger have only "Japan" for habitat, presumably southern Japan, or more strictly Kiusiu. However, in the United States National Museum we have specimens from Miyazaki, in Kiusiu, collected by Rev. C. A. Clark, and from the province of Iga, in Hondo, about 30 miles east of Osaka, through Professor Ijima. Dr. T. Lenz, in 1896, also collected it in the same general region, specimens from the provinces of Yamashiro, Setsu, and Yamato, surrounding Kioto and Osaka, being in the Hamburg Museum (Nos. 1000, 1009, 1011). Osaka, besides recording it from the provinces of Mino, Hida, and Yamashiro, mentions Hayakawa, near Hakone, Chichibu in Musashi, and Yumoto and Chuzenji Lake, at Nikko, as places where Buerger's tree-frog occurs. United States



POLYPEDATES BUENGEN, (FROM SCHLEGEL)
FOR EXPLANATION OF PLATE SEE PAGE 554



National Museum also has a large number of specimens from Mount Fuji. Whether this species goes farther north than Nikko I do not know. In Shikoku it has been collected by Dr. H. M. Smith. In the Riu Kius it is replaced by the next species.

List of	'specimens	of	Polypedates	buergeri.
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J.S. I.M. No.	Sex.	Locality.	When collected.	By whom collected.	
3904	Male a	Province of Iga, Hondo		I. Ijima.	
3905		-jdo		•	
745		Miyazaki, Kiusiu			
904	do. b	Kochi, Tosa, Shikoku	May 11,1903	II. M. Smith.	
905	Male	do	do	Do.	
906	do. ^	.¦do	do	Do.	
350	do	Mount Fuji, Hondo	May, 1898	A. Owston.	
351	do	do		Do.	
352	do	. ⁱ do	do,	Do.	
353	do	.'do	do	Do.	
354	do	_'do	do	Do.	
355	do	.1do	do	Do.	
356	do	do	do	Do.	
357	do	.'do		Do.	
358	do	.'do	do	Do.	
359	do	.1do	do	Do.	
360	do	.'do		Do.	
361	do	.ldo		Do.	
362	do	.'do		Do.	
363	do	.'do	do	Do.	
364	do:	do	do	Do.	
		.:do	1	Do.	
		do	<u> </u>		
		do			
		do	j.		
		do			

a Figs. 142-146 p. 151.

b Description, p. 151.

c Description, p. 152.

POLYPEDATES EIFFINGERIa (Boettger).

- 1860. Polypedates burgerii Hallowell, Proc. Phila. Acad., 1860, p. 501 ("Loo Choo Islands") (not of Schlegel).
- 1895. Rana ciffingeri Boettger, Zool. Anz., XVIII, July 8, 1895, p. 267 (typelocality, "either, and probably, from Okinawa, of the middle group, or from Ohoshima, of the northern group;" type, Mus. Senckenberg., No. 1074a); Offenbach. Ver. Naturk. 33-36 Ber., 1895, p. 104.

As I have no specimen of P. eiffingeri, I give below a translation of Doctor Boettger's original description of the type (fig. 147) which, thanks to his courtesy, I had the pleasure of examining in 1898. Like P. buergeri, the specimen in question has the first finger much shorter than second and the tibia about one-half the total length of head and body.

a Named for Mr. Georg Eiflinger, of Frankfort on the Main.

Original description of type specimen.—Adult female; Museum Senckenbergianum, No. 1074a; Riu Kiu Islands.—Vomerine series between the choanæ, feebly developed, small, oval, separated by a



FIG. 147.—POLYPEDATES EIFFINGERI. ABOUT 1½ × NAT. SIZE. VOMERINE TEETH. SKETCH BY AUTHOR FROM TYPE IN SENCKENBERG MUSEUM.

very wide interval; head broader than body, short, very broad; snout short triangular, anteriorly truncated; eye larger and more protruding than in P. buergeri (Schlegel); all other characters as in the latter, but the back less warty, a small white tubercle on the tibio-tarsal joint and a series of smaller, isolated white tubercles along the posterior edge of the lower arm and the tarsus, and the posterior legs shorter; the adpressed hind leg reaches with the tibio-tarsal joint to the anterior border of the eye (in P. buergeri to the nostril or to snout); the digital disks somewhat smaller than the color quite similar, but the posterior aspect of the femur

2a

the tip of the snout); the digital disks somewhat smaller than the tympanum. Color quite similar, but the posterior aspect of the femur lighter, brownish yellow, with large blackish spots and marblings.

Dimensions.	
	mm.
Length of head and body	35
Length of head	12.5
Width of head	
Tympanum	2. 25
Fore leg	22
Hind leg	
Tibia	18

Largest digital disk

Habitat.—Thus far only known as occurring in the Riu Kiu Archipelago at large. Hallowell reports Polypedates burgerii from "Ousima" and the "Loo Choo Islands," a record probably referable to the present species. The origin of the type is not known exactly, as Mr. Schmacker's Japanese collector visited all three groups in the Riu Kius, but Doctor Boettger regards it as certain that the specimen in question came either from the northern or the middle group, with the probability in favor of the latter.

List of specimens of Polypedates eiflingeri.

Museum.	No.	Sex.	Locality.	When collected.	By whom collected or from whom received.
Senckenberg	107 4 a	Female a	Riu Kiu Islands		B. Schmacker.
		a Typ	e; description, p. 154; fig. 147.	<u> </u>	

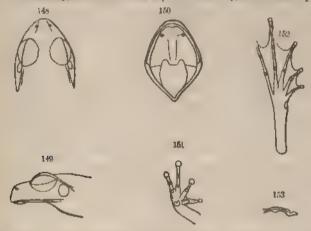
a Boettger, Offenbach. Ver. Naturk. 33-36 Ber., 1895, p. 105.

POLYPEDATES JAPONICUS (Hallowell).

1860 Iralus japonicus Hallowell Proc Phila Acad, 1860, p. 501 (type-locality, Oshima, northern Riu Kius, type, U.S.N.M. No. 7313; Stimpson, collector — Okada Cat Vert Japan, 1891, p. 66 Okinawa shima).—Fritze, Zool Jahrb Syst., VII, 1894, p. 865, author's separate, p. 16

1886 Rana macropus Bollenger, Proc Zool Soc, London, 1886, p. 414 (substitute name, "Oho shuna"); Ann. Mag. Nat. Bist. (6), X. Oct., 1892, p. 302. (Okunawa; Holst, collector. Fritze, Zool Jahrb. Syst. VII, 1894. p. 865, author's separate, p. 16.—Boltman Offenbach. Ver. Naturk. 33-36. Ber., 1895, p. 103. ("Ohoshuma or Okunawa").

I have convinced myself by a careful dissection of the fingers of one of Hallowell's cotypes of *Ixalus japonicus* that there is an intercalated bone between the penultimate and the ultimate phalanges, and that this species, therefore, belongs to the genus *Polypedates* and not to *Rana*. This arrangement of the tip of the digits is also quite easily



Figs 148-153. Polypedates Japonicus 11 m nat size 148 top of head 140, side of head, 150, open mouth, 151 underside of hand 152, underside of foot 153, tip of digit. No 7313 U.S.N.M.

discernible from the outside, the peculiar notch between the disk and the penultimate phalanx being very conspicuous.

The vomerine teeth are so insignificant that at a first inspection they seem to be absent. Under a very powerful lens, however, a transverse series of very minute teeth is discovered close to the anterior border of the choanæ—This justifies the reference of this species to Polypedates rather than to Ixalus, or Philautus^a Gistel, as the name should stand, Ixalus Duméril and Bibron, 1841, being preoccupied by Ixalus Ogilby, Proc. Zool. Soc. London, 1836, p. 119.

Description.—Adult female; U.S.N.M. No. 7313 a; Amami-o-shima, Riu Kiu; May, 1855. W. Stimpson, collector (figs. 148-153). Vomerine teeth in two oblique, very indistinct series between and very

aPhilantus Gister Nature Therr 1848 p x esubstitute name for Orchestes Tschudt, 1838 which is also preorcupied by Illiger, 1807). See Stepheger, Proc. U. S. Nat. Mus., XXVIII, 1805, p. 346.

close to the inner border of the choanæ; nostril nearer the tip of snout than the eye; interorbital space narrower than upper eyelid; horizontal diameter of tympanum less than one-half the diameter of the eye; fingers free, first much shorter than second; disks of third fingers largest, less than half the diameter of tympanum; webs of toes excised to distal end of first phalanx of fourth toe; subarticular tubercles not very prominent; inner metatarsal tubercle small, oval; no outer tubercle; tibio-tarsal articulations reach beyond the tip of the snout more than half the width of the head when hind legs are extended forward along the body, and when bent at right angles to the axis of the body the same joints overlap more than the width of the interorbital space; skin above smooth with scattered tubercles, which are more numerous on the sides, and various very narrow and not conspicuous longitudinal folds which anastomose more or less and form two shallow crescents on the shoulders, with the convexity toward the median line; throat and chest smooth; rest of underside of body, as well as posterior aspect of the femur near the base, coarsely granular; a fold from posterior border of eye over tympanum to above insertion of fore leg. Color (in alcohol), above pale drab with brown markings; a chevron mark on top of head across the middle of upper eyelids with the angle pointing backward; on the shoulders two angular marks corresponding to the glandular folds, a dark vertical band from front of eye to edge of lip, and a longitudinal one from eye over upper part of tympanum to shoulder along the lower edge of the glandular fold; legs and feet cross-barred; lower lip with some dark brown spots; a dark brown longitudinal line in front of upper part of overarm; underside otherwise white.

Dimensions.

Total length, tip of snout to vent		33
Width of head		11
Fore leg		19
Hind leg vent to tip of longest toe		62
Tibia		

The adult male is smaller; U.S.N.M. No. 7313 d, same locality, date, and collector, measures only 26 mm.; a copulatory pad of minute asperities forms a swelling on top and side of the metacarpal of first finger; there is apparently an internal vocal sac with openings on both sides of the mouth back of the tongue.

Variation.—In structure and proportions there is very little variation observable. The coloration is also on the whole very uniform, though the extent and intensity of the dark markings vary somewhat; thus there is often a dark line connecting the angles of the scapular marks, and in some there is an elongated lozenge-shaped mark on the lower back.

"Japan," this species is confined to the Riu Kius, for the original label, with the locality "Ousima, Japan," is still in the bottle with Hallowell's types of Ixalus japonicus. Boulenger, in referring the species to Rana, redescribed and renamed it (as there was already another Rana japonica) from a specimen in the British Museum, obtained by Lieut. Alfred Carpenter, R. N., at "Oho Shima," and he has since recorded its occurrence in Okinawa shima." Two specimens in the Science College Museum (Nos. 24 A and (1) P 2) from the latter locality have been examined by me and compared with Hallowell's types.

List of specimens of Polypedates japonicus.

Museum.	No. Sex.		Locality.	When collected.	By whom collected.	
U.S.N.M	7313 a	Female 4	Amami-o-shima, Riu Kiu	May, 1855	W. Stimpson.	
Do	7313 b	do	đo	do	Do.	
Do	7313 с	do	do	do	Do.	
Do	7313 d	Male b	do	do	Do.	
Do	7313 e	do	do	do	Do.	
Do	7313 f	do	do	do	Do.	
Sci. Coll., Tokyo.	24 A	Female	Okinawa shima, Riu Kiu		; 	
Do	(I) P 2	do	Naha, Okinawa	·····························	Shiraishi.	

Type; description, p. 155; figs. 148-153.

POLYPEDATES LEUCOMYSTAX b (Gravenhorst).

- 1829. Hyla leucomystax Gravenhorst, Delic. Mus. Vratislav., p. 26 (type-locality, Java; type in Breslau Mus.; Kuhl, collector).—Rhacophorus leucomystax Boulenger, Proc. Zool. Soc. London, 1889, p. 29 (southern China and eastern Himalayas to Malay peninsula and archipelago).
- 1829. Hyla sexvirgata Gravenhorst, Delic. Mus. Vratislav., p. 28 (type-locality, Java; type in Breslau Mus.; Reinwardt, collector).
- 1835. Hyla quadrilineata Wiegmann, Nova Acta Acad. Leop. Carol., XVII, Pt. 1, p. 260, pl. xxii, fig. 1 (type-locality, Manila, P. I.; Meyen, collector).
- 1841. Polypedates rugosus Duméril and Bibron, Erpét. Gén., VIII, p. 520 (typelocalities, Java and Manila; types in Paris Mus.).
- 1858. Polypedates maculatus Guenther, Cat. Batr. Sal. Brit. Mus., p. 78 (part: China; Philippines).
- 1860. Polypedates megacephalus Hallowell, Proc. Phila. Acad., 1860, p. 507 (type-locality, Hongkong).
- 1882. Rhacophorus maculatus var. quadrilincata Boulenger, Cat. Batr. Sal. Brit. Mus., p. 84 (Singapore, Java, Philippines, Formosa).
- 1885. Hylorana longipes Fischer, Archiv Naturg., LI, Pt. 1, p. 47 (type-locality, Pagat, southeast Borneo; type in Brit. Mus.; Grabowsky, collector).
- 1889. Rhacophorus leucomystax var. sexvirgato Boulenger, Proc. Zool. Soc. London, 1889, p. 30.

Description.—Adult female; Brit. Mus. No. 79.6.20.27; Formosa; Matthew Dickson, collector. Vomerine teeth in two nearly straight

b Description, p. 156.

a Proc. Zool. Soc. London, 1892, p. 302.

b From λευκός, bright, white; μυσταξ, upper lip.

rows between the choanæ, contiguous with the latter and separated from each other by a space as wide as the choanæ; nostrils nearer tip of snout than eyes; upper eyelids only two-thirds the interorbital space; diameter of tympanum about three-fourths that of the eye; fingers with barely a rudiment of web; first finger shorter than second by half the diameter of the disk, which is more than half that of the tympanum; toes about half webbed, inner metatarsal tubercle much smaller than digital disks; no outer tubercle; tibio-tarsal joint extends beyond the tip of the snout; skin nearly smooth above and on throat and chest, strongly granular on belly and underside of thighs; a sharp, narrow fold from posterior corner of eye in a straight line over tympanum, ending rather abruptly some distance past the insertion of the fore limb. Color (in alcohol), pale brownish gray above, with four obscure longitudinal brownish bands, the lateral ones broader and originating on the anterior portion of the upper eyelids, the median ones narrower, originating on the snout and apparently confluent on the sacrum; a narrow blackish line runs from the tip of snout through the nostrils, middle of eyes, and over the tympanum just underneath the postocular fold; on the flanks a few distinct blackish reticulations; edge of jaws whitish, accentuated by a very narrow line of dark brownish.

Total length, tip of snout to vent 58 Snout to eye. 11 Snout to posterior border of tympanum 22 Nostril to eye. 8 Diameter of eye. 7 Diameter of tympanum 5 Interorbital width 7 Fore leg. 36 Tibia. 32 Digital disks 2.75

Habitat.—Polypedates leucomystax is said to inhabit "Southern China and Eastern Himalayas to the Malay peninsula and archipelago." The striped form, supposed to be only a color variety," has been found in Java, Sumatra, Singapore, the Philippines, and in Formosa, a specimen from the latter island, collected by Mr. Matthew Dickson, being in the British Museum.

aMr. S. S. Flower, who studied *Polypedates leucomystax* alive in the Malay peninsula, says that the striped specimens do not represent "even a true variety, as the dark lines appear conspicuously and disappear entirely in the same individual. If killed with or without the lines visible they remain so in spirit. In Singapore at different times I noticed many young frogs which had just left the water, all of which had the dark lines visible; these disappear as the animal grows, only to reappear temporarily in the adult." (Proc. Zool. Soc. London, 1896, p, 906.)

List of aperimens of Polypedates beacomystar

Museum	No.	Sex	Locality	When col- lected	By whom col- lected
Brit Mus	70, 6, 20, 27	Femalea	Formosa		M Dickson

« Description p. 157

TADPOLES.

The characters of the larve of the tailless batrachians of Japan and adjoining territory have received no attention thus far Boulenger has given the study of the European forms special attention, and Flower has described several eastern Asiatic species. From Boulenger's key to the European tadpoles' and Flower's descriptions it is possible to draw up a general scheme of the Japanese forms, by which at least the genera may be recognized. Upon this basis it

will then be comparatively easy for the resident naturalists to gradually extend the key to include all the species.

It will be necessary for this purpose to give a brief account of the morphological characters which are utilized for the distinction of these larve. The following is therefore condensed from Boulenger's excellent chapter on the tadpoles in the work alluded to above.

Tadpoles for identification are preferably selected after the budding of the hind legs and before the appearance of the front legs.

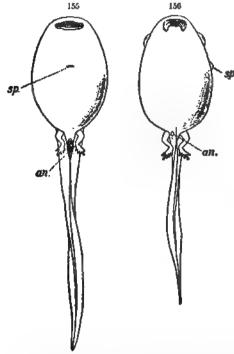


FIG. 184. OPEN MOUTH OF TAOPCIE OF RANA TEMPORARIA. 15 X NAT. SIZE. BO, BUCCAL OHIFICE, IP. LASTAL PAPILLE. M. LIPER M. L. WER MANDIBLE. I. SERIES OF TEFTH ON CLIPBRID. I. SERIES OF TEFTH ON LOWER THE ADAPTED FROM PROC. ZOOL. GOO. LONDON, 189. PL. XLV, FIG. 3A.

By body is meant head and body together, and its longitudinal measurement is taken to the origin of the hind limbs. Depth of tail includes crests.

By mouth (fig. 154) is understood the opening with its horny beak, not unlike that of a cuttlefish, as well as the surrounding, funnel-shaped lip. This may be entirely bordered by fleshy papille, or these may be restricted to the sides, or to the sides and the lower border. The inner surface of the lip is furnished with ridges armed with series of minute, bristle-like, erect, horny teeth. By drawing an imaginary line across the mandibles, the lip may be divided into an upper and a lower portion, the series of teeth above the upper mandible being termed apper labral, those below the lower mandible

being lower labial. These are described as first, second, third, etc., proceeding from the outer border toward the beak in both the upper and lower sections of the lip. The first series, either in the upper or



Figs. 155-156. Lower view of tadpoles, showing location of spiraculum and anal opening. 155, Discoglosooid (costate) toad, 156, Hyla 22, spiraculum, 471, anus. (From Boulenger, Proc Zool. Soc London, 1891, p. 596.)

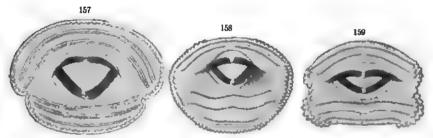
lower section, may be marginal or may be within the border, which is then occupied by fleshy papillæ. The arrangement of the series is expressed by a formula: 3, for instance, indicating the number in the upper and lower sections, the line corresponding to the beak.

By spiraculum (figs. 155-156) is understood the opening or tube by which the water is expelled from the bronchial chambers. In our species it is located either on the left side or in the median line on the breast.

The anal opening (figs. 155-156) is also a tube situated at the beginning of the tail either in the middle line or laterally beside the origin of the lower caudal crest.

The openings of numerous

sensory ducts form more or less complicated systems of lines on head and body, and are of some systematic value. A glandular streak extending from the nostril toward the eye is the lachrymal canal.



Figs. 157 159 Mouth of tadpoles $10 \times$ nat size. 157, Bombina salsa; 158, Hyla abbobea $15 \times$ nat size 159, Bufo bufo (From Boulenger, Proc. Zool, Soc. London, 1891, pl. xlvii, fig. 5a, pl. xlvii, figs. 1a and 4a $_{j}$

PRELIMINARY KEY TO THE TADPOLES

- - series of Arms median fig. .55, spiraculum directed backward, lower hp only

papillose at the corners

Bufo chafo, by 159 reads calamita, melanostatus [Flower, Proc. Zool]

- Soc. 1896 pl. xuiv, fig. 35; c¹ Anns dextral, fig. 156, spiracollain derected backward and upward papilla continuous along lower. Lp or only narrowly interrupted by the middle
 - d Amas open nearboys the lower edge of the tail appear and all crest extending fact award on the back almost to between the eyes. Hyla arborea fig. 158)
 - d² Anus opening close to the lower edge of the tail upper caudal crest not extending forward beyond the vertical of the spiraculum.
 - e) Papillose series bordering lower hip uninterrupted in the middle. Rana f¹ Upper hip not bordered by papillie, beak white, more or loss broadly bordered with black.
 - g. Series of laboral terth $\frac{2 \text{ or } 3}{3}$ R. macrodon [Flower P. Z. S., 1899, pl. tix fig. 1]. escalenta; arealist g^2 . Series of laboral terth $\frac{3 \text{ to } 5}{4}$... R. temporaria fig. 154 against
 - f^2 I pper lip bordered by papilla like lower one—beak entirely black, R—tigecone [Flower P Z S , 1899, pl tix, fig 2]
 - e² Papillose border of lower hip narrowly interrupted in the haddle Polypedates by computer Flower, P. Z. S. 1896, pl. x11v, fig. 2, 1899.

platty, bg 3]

at Mouth without hard beak, labin teeth or papillal consisting of a simple upper lip and a contractile lower one. Microhyla ornata [Flower P. Z. S., 1899, pl. Lx, fig. 1]

Class REPTILIA.

1768 Reptilia LACRENEC Synops Rept. p. 19 compare p. 6).

1820 Pholidota MERREM Tent Syst Amph p 5

1826 Monophoa Pitzingen Ne ie Classif Rept. p. 3.

1841 Haplopuon Lecekart Zool Brachst 11 p 31

The existing reptiles are divided by Dr. 11. F. Osborn into two subclasses, Diapsida and Synapsida. To the latter belongs only one existing order, viz. the turtles (Testudinata), which are characterized by having the scapular arch internal to the ribs, while in the three existing orders of the Diapsida it is external. These orders are: Crocodilini (also called Lorie ita or Encydosauria), characterized by two-headed ribs; Rhynchocephalia, represented by a single surviving genus in New Zealand (Sphenodon), superficially resembling a lizard, but distinguished from the next order by having, among other characters, the quadrate bone immovably fixed to the adjacent cranial elements

by suture, while in the Squamata, embracing snakes and lizards, it is loosely articulated with the Tranium at the proximal end; the last two orders have one-headed ribs.

As stated, recent Rhynchocephalia occur only in New Zealand, and the crocodiles are not known with certainty to enter our territory, in which consequently only the Squamata and the Testudinata are found. These two orders are always easily distinguished by their external appearance alone, the solid encasement of the turtles in their bony shell, covered by horny plates or a soft skin, being a character quite sufficient. Moreover, the presence of teeth in the squamate order contrasts easily with the toothless horn-sheathed jaws of the turtles.

Subclass DIAPSIDA.

1903. Diapsida H. F. Osborn, Science (n. s.), XVII, Feb. 10, 1903, p. 276.

Order SQUAMATA.

- 1811. Squamata Oppel, Ordn. Rept., p. 14.
- 1825. Squamosa LATREILLE, Fam. Nat. Règne Anim., p. 93.
- 1831. Ophidosaurii Eichwald, Zool. Specialis, III, p. 168.
- 1854. Streptostylica STANNIUS, Handb. Zootom., II, Wirbelth., Pt. 2, Amph., p. 5.
- 1866. Lepidosauria HAECKEL, Gen. Morphol., II, p. CXXXVI.
- 1898. Sauria Gadow, Classif. Vertebr., p. 24.

Besides the chameleons, which form a suborder by themselves (Prendentia, or Rhiptoglossi), but do not occur east of India, the order Squamata consists of two suborders—the lizards (Sauria) and the snakes (Serpentes). The anatomatical characters which distinguish them consist chiefly in the separate condition of the rami of the lower jaw in the snakes, while they are solidly united in the lizards; in the total absence even of vestiges of a pectoral arch in the snakes; and in the closing of the brain case anteriorly in the latter. There are no external characters which will in all cases separate a snake from a limbless lizard, except that in the latter the tongue is not retractile into a basal sheath, while in most cases they possess distinct eyelids and ear-openings, both wanting in the snakes. All the lizards within the region here treated of have four limbs and are thus easily distinguished from the snakes.

Suborder SAURIA.

- 1788. Lacertæ Batsch, Anleit. Kenntn. Thiere Mineral., I (p. 437).
- 1802. Sauria Macartney, in Ross' Transl. Cuvier's Lect. Comp. Anat., I, tab. m.
- 1803. Sauri DAUDIN, Hist. Nat. Rept., V, tabl., p. 8.
- 1804. Saurii Latreille, Nouv. Dict. d'Hist. Nat., XXIV, tabl. méth., p. 61.
- 1828. Pneumaturomolgaci Ritgen, Nova Acta Acad. Leop. Carol., XIV, p. 274.
- 1828. Sauræ WAGLER, Isis, 1828, p. 860.
- 1831. Lacertina Mueller, Tiedem. et Trevir. Zeitschr. Phys., IV, p. —.

1839. Saures Swainson, Nat. Hist. Class. Fish. Amph. Rept., II (Lardner's Cab. Encycl.), p. 148.

1842. Lacertilia Owen, Rep. Brit. Ass. Adv. Sci. Plymouth Meet., 1841 op. 1447.

1845. Saura Gray, Cat. Liz Brit. Mus., p. 3.

1849. Porpopoda Mayer, Rheinhaend und Westphal Verhandl, VI (p. 177).

1857 Lepidota Jan, Cenni Mus Milano, p. 37

1886 Eriglossa Gill, Rep. Smithson, Inst., 1885, p. 801

1898. Autosauri Harriken, in Gadow, Classif Vertebr., 1898, p. 24

The saurian fauna of Japan is very fragmentary, containing at most 30 species belonging to only 4 families. It is very suggestive that the bulk of this number belongs to the two families tiekkonide and Scincida, which are nearly cosmopolitan in their distribution. Members of these families, moreover, seem to be more easily transported to distant islands than almost any other lizards. Thus, among the species occurring in Japanese territory, Hemidactulus frenatus occurs throughout the islands and along the shores of the western Pacific, from Korea to Australia, the entire Indian Ocean, and even in St. Helena, in the Atlantic Ocean, while the Cryptoble pharus pacilo pleurus has a distribution even more extended. The most remarkable range, however, is that of Leiolopisma laterale, which furnishes one of the most extraordinary instances of disconnected distribution, as the specimens of the East Asiatic colony seem to be practically indistinguishable from those occurring in North America east of the Rocky Mountains.

The herpetological fauna of Formosa is as yet too little known to allow us to make any generalization as to the route by which the Indo-Malayan species have reached the Riu Kiu Islands

Of the rather numerous superfamilies into which the lizards may be divided, only three are represented in Japan and neighboring countries, viz. the Gekkonoulex, the Agamoidea, and the Lacertoidea, the first two with one family each, the latter with two, the Lacertida and the Scincida. Some of their main characters are included in the following:

TABLE OF SAURIAN PAMILIES IN JAPAN, ETC.

b1 Premaxillary double, body with osteodermal plates Scincips, p 193

b² Premaxillary single no osteodermal plates I ACERTID F, p. 228

Taking cognizance of external, easily verified characters only, the species occurring within our area may be referred to their respective families by the following:

ARTIFICIAL KEY TO THE FAMILIES OF LIZARDS OCCURRING IN JAPAN AND ADJACENT TERRITORY.a

- a^1 No large symmetrical shields on top of head.
 - b^1 Digits dilated; no movable eyelids; tympanum exposed Gekkonidæ, p. 164
- b^2 Digits compressed; movable eyelids; tympanum concealed ...Agamidæ, p. 182 a^2 Top of head with large symmetrical shields.

 - b² Ventral scales squarish, in longitudinal and transverse series...LACERTIDÆ, p. 228

Family GEKKONIDÆ.

The Geckos are lizards with smooth or papillose tongue, dilated clavicles and biconcave vertebræ; mostly without movable eyelids and with vertical pupil; toes variously modified or dilated into more or less adhesive organs.

A large family they are represented in all the hotter portions of the globe, but are most numerous in the Indian and Australian regions. In the area covered by this work only four or five genera have been found. Owing to the ease with which the geckos may be accidentally transported from place to place, they are often introduced unintentionally into new localities by human agency.

Probably most of the species are nocturnal, and owing to the construction of the toes are enabled to run with ease on smooth perpendicular surfaces. Some species emit a chuckling sound resembling the word "gecko," hence their name. They lay round eggs with a hard, white shell.

Swinhoe has given a spirited account of the habits of the common Japanese house gecko as observed by him in Formosa, which deserves to be reproduced here.^b

In running over the perpendicular face of the wall they keep so close and their movements are made so quickly with one leg in advance of the other that they have the appearance at a distance of gliding rather than running. The tail is somewhat writhed as the body is jerked along, and much so when the animal is alarmed and doing its utmost to escape; but its progress even then is in short runs, stopping at intervals and raising the head to look about it. If a fly perch on the wall it cautiously approaches to within a short distance, then suddenly darts forward, and with its quickly protruded glutinous tongue fixes it. Apart from watching its curious maneuvers after its insect food, the attention of the most listless would be attracted by the singular series of loud notes these creatures utter at all hours of the day and night, more especially during cloudy and rainy weather. These notes resemble the syllables "chuck-chuck" several times repeated, and, from their more frequent occurrence during July and August, are, I think, the call notes of the male to the female. During the greater part of the day the little creature lies quiescent in some cranny among the beams of the roof or in the wall of the house where, however, it is ever watchful for the incautious fly that approaches its den, upon whom it darts forth

a For nomenclature of head-shields of lizards, see p. 194, figs. 176-178.

b Swinhoe, Ann. Mag. Nat. Hist. (3), XII, 1863, pp. 222-223.

with but little notice. But it is by no means confined to the habitations of men. Every old wall and almost every tree possesses a tenant or two of this species. It is excessively lively, and even when found quietly ensconced in a hole, generally manages to escape—its glittering little eyes, black with yellow other iris) appearing to know no sleep, and an attempt to capture the runaway seldom results in more than the seizure of an animated tail wrenched off with a jerk by the little fellow as it slips away, without loss of blood. The younger individuals are much darker than the larger and older animals, which are sometimes almost albinos.

I have found the eggs of this gecko in holes in walls or among mortar rubbish. They usually lie several together, are round and did not seem to me to offer any appearance other than those of ordinary lizards. The young when first hatched, keep much to themselves under stones in dark cellars where they live until they attain two-thirds the size of the adults. At this stage they begin to show out in conspicuous places, but always evince alarm at the approach of their older brethren; for what reason, I could not make out.

KEY TO THE GENERA OF GERRONID E INHABITING JAPAN AND ADJACENT TERRITORY

- al Infradigital plates in a single series—the free distal joint at the extremity of the digital expansion
- a² Infradigital plates in a double series, the distal joint rising from within the extremity of the digital expansion
 - b' Inner digit with a compressed clawed phalanx
 - cl Digits free, body without lateral dermal expansion . Hemidaetylus, p. 172
 - c² Digits half webbed, body with a much developed lateral derinal expansion

Genus GEKKOª Laurenti.

- 1768 Gakko Latrenti, Syrops Rept., p. 43 type, G. rerticillaturo.
- 1800 Gecko Cuvier, Legons d'Anat Comp., I, tabl. in (emendation)
- 1810. Geous RAFINESQUE, Caratteri, p. 9 (emendation,
- 1826 Platydactylus Fitzinger, Neue Classif Rept., p. 13 (same type) (not of Oken 1817)
- 1833 Lonatodactylos van der Hoeven, Handb Dierk . If Pt. 2 p. 342 (type, L. vitatos.)
- 1843 Scelatretus Firzinger, Syst. Rept., p. 101 type, (c. rututus)

GEKKO JAPONICUS Duméril and Bibron .

YAMORI

Plate XIII.

1836 Platydactylus japonicus Duméril and Bibron, Erpet Gén., III. p. 337 (type-locality, Japan types in Paris Mus. — Dimeril Cat Meth Rept. Mus. Paris. I. 1851. p. 37. Gecko japonicus (clentres. Rept. Brit. India 1864. p. 103. southern Japan Chasan, China. Formosa). Hitters. Dome, Sitz. Ber. Ges. Naturf. Fr. Berlin, 1880. p. 113. - Botlenger, Cat.

[&]quot;A name derived from the sound made by several species.

Liz Brit Mus., I, 1885, p. 188 (Japan, Kiukiang Mis., Chefu, Shanghai, Szechuch Ningpo, Hongkong, China; Formosa -Okada, Cat Vert Jap., 1891, p. 71 (Tokyo, Chukuzen, etc., Okinawa) - Boettger, Kat. Rept Mis Schekenberg, I, 1893, p. 34 (Japan; Hongkong, Canton, Shanghai, Prov. Guan-dung, China. —Fritze, Zool, Jahrb Syst, VII, 1894, p. 860, author's separate p. 11 (Tokyo, Okinawa) - Gekko japonicus Steineger, Journ Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 218 (Taipa, Formosa).

1838 Platydartylus jamore Temmenek and Schlegel, Fauna Japon., Rept., p. 103 (type-locality, southern Japan, types in Leiden Mus.; Siebold, collector Bleeker, Natuurk Tijdschr Nederland, Indie, XVI, 1858, p. 204 (name only) Martens, Preuss, Exped Ost-Asien, Zool, I, 1866, pp. 109, 112 (Nagasaki) Gecko (Platydactylus) jamore Temmenek and Schlegel, Fauna Japon, Rept., 1838, pp. 136, 139, Saur. Batr., pl. II, figs. 1-4.5

1842 Gecko chinensis Gray, Zool. Misc., p. 57 (type-locality, China; type in Brit. Mus. J. Reeves, collector). Platydactylus chinensis Martens, Preuss. Exped. Ost-Asten, Zool. 1, 1876, p. 374. Nagasaki).

1842 Remidietylus namus Canton, Ann. Mag. Nat. Hist., IX, Aug. 1842, p. 482 (type-locality, Chusan, China, types in Brit. Mus., Cantor, collector)

1863. Gecko sundonie Swishot, Ann. Mag. Nat. Hist. (3), XII. p. 222 (Taiwan fu, Formosa, habits) nomen nadam, not of Guenther 1864)

1891, Platydactylus yamori Fritze, Mitth. Deutsch, Ges. Ost-Asiens, V, p. 239 , Tokyo not in Yezo

1902. Gehyra intermedia Brown, Proc. Phila. Acad., 1902, June 11, p. 183 (type-locality, probably Okonawa shima, type in Wistar Inst. Phila. No. 572, orig. No. 46, Furness and Hiller, collectors.

The specimens from Tsushima and Fusan, Korea, are identical with the Japanese specimens, showing no tendency toward Gekko swinhonis from Northern China. The latter differs in having very few dorsal tubercles, median pair of chin-shields smaller, and scarcely any trace of web between the toes.

Description (figs. 160-163) Adult male; U.S.N.M. No. 31821; Yamagawa, Province of Satsuma, Kiusiu; June 14, 1903; Hugh M. Smith, collector. Rostral squarish, about twice as wide as high, bounded above by two large internasals and two small scales between the latter, the superior angles entering the nostrils; nostril between first supralabial, rostral, large internasal, and three smaller shields above and behind; distance between nostril and eye equals distance between cye and ear-opening; diameter of eye a little more

a Reproduced in this work on Plate XIII.

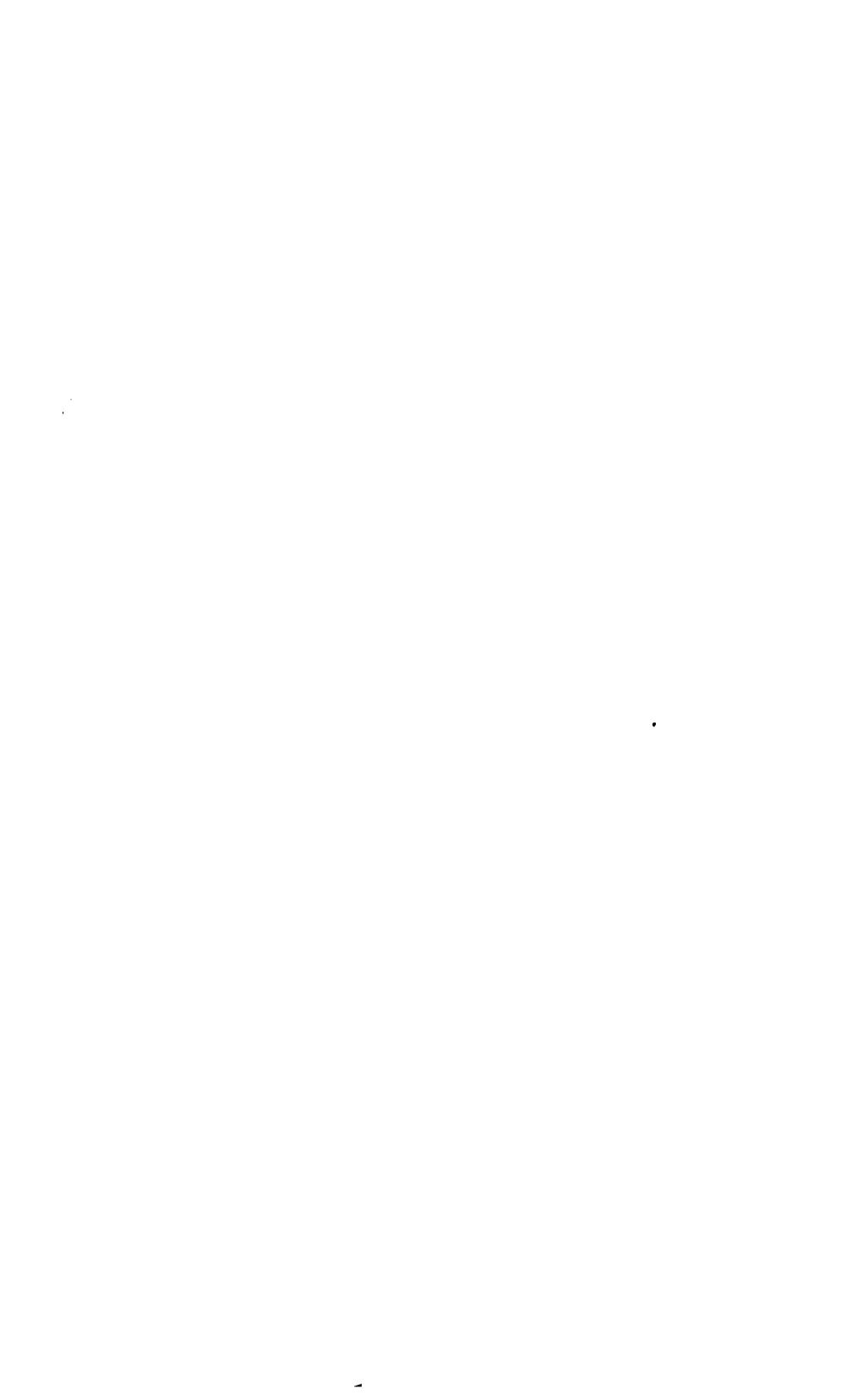
b 1864 Cicko swinhoms GUENTHER Rept Brit India p 104, pl. хи, fig. A (typelor ality, Peking Type in Brit Mus., Swinhoe, collector) — BOULENGER, Cat. I iz Brit Mus., I 1885 p 189 Peking) — MUELLER, Verh. Naturf. Ges Basel, VII., Pt. 3 1885 (Tien-tsin)

18. Greko japonicos Moelle Ndorff John N. China, Br. R. Asiat, Soc. (n. s. XI, p. 104 (Prev. Chili, China) enot of Duméril and Bibron. —Mérilly, Zichy's Dritte Asiat. Forschunger. II, 1901, p. 44. pl. vi. figs. 1.2 (Peking).

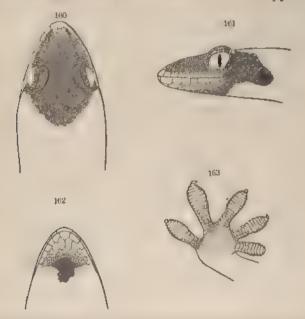
1885 Gerko sumhon Boetteer, Offenbach Ver Naturk 24 25 Ber., p. 139, 26 28 Ber 1888, p. 61 (Muau-feng-shan, near Peking), Kat. Rept. Mus Senckenberg., I, 1893, p. 35.



GERNO JAPONICUS. (FROM SCHLEGEL)
FOR EXPLANATION OF PLATE SEE PAGE 554.



than half the distance between eye and tip of snout; ear-opening small, oval, less than one-half the diameter of the eye; eleven upper labials; mental pentagonal, scarcely larger than the adjacent lower labials; nine lower labials; behind mental a pair of median, somewhat elongated chin-shields, on either side of which another similar shield of about the same size, behind these several polygonal smaller shields; whole upper surface covered with granules, those on the snout considerably larger, among the granules, from the eyes backward to the root of the tail, numerous small, rounded tubercles, their mutual distance averaging about one-half the diameter of the eye, not arranged in regular longitudinal series, though about twelve tubercles can be counted in a line across the back; upper surface of



Figs 100-163. Clerko japonicus - 2 s nat size - 160, top of head, 161, side of head, 162 chin, 163 underside of foot - No 1752) U.S.N.M.

limbs covered with granules like the back, lower surface of body and limbs covered with imbricate scales except on the throat and anterior portion of neck, which are covered with granules of the size of those on the back; first toe with 9 lamelle, fourth with 15 underneath; second, third, and fourth toes connected by a basal web, an angular series of six preanal pores (by an anomaly two inner pores on left side not developed); base of tail swollen, with a single large tubercular scale on each side; tail suddenly tapering from the basal swelling, slightly depressed, oval in section, covered above with small scales, the annular arrangement of which is chiefly marked by the straight posterior outline of every ninth row, and a pair of median tubercles

on the latter; underneath scales larger with a median series of wide plates, every third of which is a little wider, its posterior edge corresponding to the posterior outline of the annulus. Color (in alcohol) drab gray above with a double series of obscure dusky spots on back and crossbars on limbs and tail; an obscure dusky band from nostril through eye to occiput meeting its fellow from the other side on the latter; a similar band from eye to ear-opening, and ill-defined dusky spots on both upper and lower labials.

Dimensions.

Total length	mm. 106
Snout to vent	
Vent to tip of tail	46
Snout to ear-opening	16
Greatest width of head	13
Fore leg, from axilla	18
Hind leg, from groin	26

The adult female (U.S.N.M. No. 31822; same locality and collector) differs chiefly in the absence of the preanal pores and of the basal swelling of the tail; the spur-like tubercle on each side of the base of the latter is present, but is smaller than in the male; the tail itself is slightly broader and more depressed.

Variation.—Besides slight differences in the number of labials, in the relative size and shape of the chin-shields, and in the number of tubercles on the occiput, it may be mentioned that some specimens, for instance, U.S.N.M. No. 13563, from Nagasaki, have plainly developed tubercles among the granules on the upper side of forearm and tibia, especially on the latter. The number of preanal pores in the males varies somewhat. In some specimens the series is narrowly interrupted on the middle line by a single poreless scale, in others the series is continuous. Thus, No. 13563, from Nagasaki, and No. 13751, from Yokohama, have three pores on each side of the median line; Sci. Coll. No. 30, from Formosa, has 9 pores in a continuous line; No. 14866, from Osaka, has 7 altogether, like a specimen from Shikoku, No. 31895.^a The spur-like tubercle on each side of the base is very variable. Often there is a group of three large tubercles, and in No. 13563 these are supplemented by two additional large scales at their base.

When the tail is broken off, the new tail grown, as in No. 13563, approximates the old one in size and shape, but the scales are larger somewhat imbricate, and not arranged in transverse series; neither is there any trace of annuli nor of tubercles; a few of the scales on the under side are widened, but there is no median series of regular shields.

a Boulenger's statement (Cat. Liz. Brit. Mus., I, 1885, p. 188), that there are "six to sixteen on each side" is due to a lapse.

Habitat.—The center of its distribution seems to be south-central and eastern China. On the coast it occurs from Hongkong to Chefu. To the north it is replaced by G. swinhonis. Outside of China it is found in Formosa, the Riu Kius, Korea, Tsushima, and southern Japan.

In Formosa it is said to be "common everywhere," though the only localities from which specimens have been recorded are Taipa and Taiwan fu Doctor Fritze reports it equally common in Okinawa. I have before me specimens from Miyako shima, Tsushima, and from Fusan, Korea, collected by Jouy. They are probably a recent introduction in the latter place.

In Japan proper it occurs at least as far north as Tokyo, and specimens from Yokohama, Nagasaki, and Osaka are in the various museums, while Okada enumerates it from the province of Kawachi, Suwo, and Nagato, in Hondo, and Chikuzen, in Kiusiu. Dr. Hugh M. Smith collected it in Satsuma and Shikoku. It does not seem to be found in the mountain districts, and Fritze specifically denies its occurrence in Yezo. Doctor Nozawa writes me that he has "heard of its presence in south Yezo," but if specimens have been taken there they have probably only been introduced in cargoes from farther south. In this connection I may cite Mr. E. Klocke's experience, who once observed a Gekko on the walls of a hut in the Chitose forests near Lake Shikotko, which he suggests might have been unintentionally introduced from Hondo.^a

List of spiermens of frekko japonicus

Museum	No	Sex and age	Locality.	When col- lected	or Iron whom meeted
U.S N.M	13563	Marc	Nagasa кı	Mny 1881	Jony and Dase
Do.	13751	do. a	Yokohama ") .		P. L. loay
Do	34860	13,	Oaaka		R Hiteheock
Do	17413		busan Korea	1885	P L. Juny
Do	17514		do .	1885	Do
Do .	17515		do	1885	Do.
Do	17521	Femusia	Taushime .	May , 1886	Do
Do .	21362	Young	Fusar Korea	May 29, 1996	1)0
Do	31823	Malac	Yamagawa K usui	Jun 14 1903	Il M Smith
Do	31822	Female	, do	do .	11n
Do	31896	Mang	Kocht Shakoku	May 11 1903	De
Do.	31966	Young	do .	.do	Do
Do .	341%	do	Karagawa Yokohan a	Dist 14 1 1965	4 Owaton
Do	34187	do	do ,	,do	Do
Do.	34189	For sle .	do	May 14 1902	Tho
Do	34190	do	10	do.	Do
Do	31528	Mair	Міуакознача Кін Кан		
Bet Coll Tokyo	30	do	Tupa Formesa	Sept 1999	T Tada
Wistar Inst	3/2	(d)	Rei Kiii		Furness and Hiller

a Annot. Zool Japon., V., Pt 2, 1904, p. 85.

Genus PTYCHOZOONa Kuhl.

- 1822. Ptychozoon Kuhl, Isis, 1822, p. 475 (nomen nudum).
- 1826. Ptychozoon Fitzinger, Neue Classif. Rept., p. 13 (type, P. homalocephalum).
- 1827. Pteropleura Gray, Philos. Mag. (2), II, p. 56 (type, P. horsfieldu).
- 1893. Ptychozoum Boettger, Kat. Rept. Mus. Senckenberg., I, p. 35 (emendation).

There are two species of *Ptychozoon*, namely, *P. kuhli ^b* and *P. horsfieldii*, which differ considerably. The more essential characters consist in the absence of enlarged tubercles among the dorsal granules in *P. horsfieldii*, the shorter series of preanal pores and the presence of a distinct series of femoral pores in the males of this species. Also in the much feebler segmentation of the tail, as well as the much smaller development of the caudal lobes, which do not join to form a terminal large flap as in *P. kuhli*.

PTYCHOZOON HORSFIELDII c (Gray).

- 1827. Pteropleura horsfieldii Gray, Philos. Mag. (2), II, July, 1827, p. 56 (typelocality, India: Singapore; type in Brit. Mus.; Hardwicke, collector).—

 Platydactylus horsfieldii Fitzinger, Syst. Rept., 1843, p. 101.—Ptychozoon horsfieldii Mueller, Verh. Naturf. Ges. Basel, X, 1892, p. 209, pl. iv (Penang).
- 1845. Ptychozoon homalocephala Gray, Cat. Liz. Brit. Mus., p. 164 (part: Singapore) (not of Creveld).—P. homalocephalum Boulenger, Cat. Liz. Brit. Mus., I, 1885, p. 190 (part: Singapore); Proc. Zool. Soc. London, 1887, p. 146 (Riu Kiu Islands).—Okada, Cat. Vert. Japan, 1891, p. 71 (Okinawa).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 860; author's separate, p. 11.

Thanks to the courtesy of the authorities of British Museum, I have been able to compare Pryer's specimen, said to have come from "Loo-Choo," with the type of Gray's P. horsfieldii (which is a female and consequently lacks the pores) from Singapore, and found them to agree completely. A male from Mount Dulit, Borneo, in the same museum, differs only in having three more preanal pores.

Description (figs. 164-166).—Adult male: British Museum, No. 87. 1. 31. 5; "Loo-Choo Islands;" presented by Mr. Pryer. Rostral almost quadrangular, large, at upper corners entering nostrils; the latter surrounded by rostral, first labial, one postnasal, and two supranasals; between the anterior supranasals a large nearly quadrangular shield separating them entirely and joining the rostral; twelve supralabials; mental small triangular, followed by a pair of

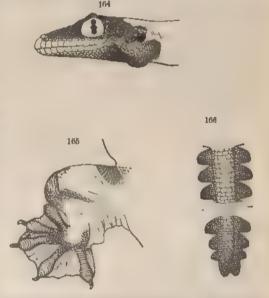
a From $\pi r v \xi$, a fold; $\zeta \omega o v$, an animal.

b Ptychozoon kuhli is Creveld's Lacerta homalocephala, the name of which is preoccupied. See Stejneger, Proc. Biol. Soc. Washington, XV, March 5, 1902, p. 37.

c Named for Dr. Thomas Horsfield. Born May 12, 1773, at Bethlehem, Pennsylvania; died in London, July 14, 1859. Lived a long time in Java. Author of Zoological Researches in Java, etc. (1821–1824), and Plantae Javanicae, 3 vols. (1838–1852).

elongated median postmentals; top of head, back, and throat covered with uniform granules, without tubercles, belly with scales several times larger than the dorsal granules; parachute covered above with larger quadrangular scales in horizontal rows alternating like bricks in a wall, below apparently entirely without scales; an angular series of eight preanal pores, and a series of about twelve smaller pores near the distal end of the femur; the whole animal is strongly depressed and laterally surrounded by a series of dermal expansions or flaps, the one on the body between axilla and groin assuming the character of a parachute, being more than one-half the width of the whole body; a small flap

behind angle of mouth underneath the ear-opening, one in the angle between upper and lower arms, and a small one on the posterior side of each of these; similar flap in angle between femur and tibia behind, and a small one on the outer side of the tibia, but none on the femur: tail with a lateral series of small rounded lobes, gradually decreasing in size toward the tip which is not expanded: the segments thus indicated by each pair of lobes are further marked by a couple of slightly enlarged flat scales on the upper surface of the tail near the median line;



Figs 164-166. PTYCHOZOON BORSFIELDIE 11 M NAT SIZE, 164, SIDE OF HEAD, 166, UNDERSIDE OF SIGHT HIND LEG AND FOOT. 166, UNDERSIDE OF TAIL, MIDDLE AND TERMINAL PORTIONS NO 24680, U.S.N.M.

hands and feet webbed to the tips of the digits. Color (in alcohol) light drab gray above with four narrow, wavy, dusky cross bands on the back and six wider bars on the tail; a line of ill-defined circular spots of same color from eye to shoulder; underneath whitish.

Dimensions	
	78.07
Total length	130
Snout to vent.	68
Vent to tip of tail	62
Snout to eye	8
Snout to ear-opening .	18
Width of head	15
Fore limb	32
Hind limb	82

The female lacks preanal and femoral pores.

Habitat.—This remarkable species is an inhabitant of the Malayan

peninsula, the Natuna Islands, and Borneo.

A single specimen presented by Mr. Pryer to the British Museum as having been obtained by his Japanese collector in the Riu Kiu Islands, is the only one thus far recorded east and north of the region indicated above. As no other collectors have found it in the Riu Kius or the intervening regions, I may perhaps be justified in expressing a doubt as to the correctness of the locality. It may be remembered that Pryer himself did some collecting in Borneo in 1880, and it is possible that the specimen in question may have become mixed up with the Riu Kiu collection.

List of specimens of Ptychozoon horsfieldii

Museum	No.	Sex	Locality	1	When col- lected	By whom collected,
Brit Mus U.S.N.M	87 1 3, 5 24030	Ma e a Female b	Loo Chee Islands [*] Trong, Lower Slam		1897	H J S. Prver Dr W. L Abbett.
	o Do	seription, p	170-	b Figs	164 166	-

Genus HEMIDACTYLUSª Oken.

1817. Hemidactylus Oken, Isis, 1817. p. 1183 (based on Cuvier's "Hemidactyles," type "Gecko tuberculeux Dandin")

1843. Tachybates Fitzinger, Syst. Rept., p 105 (type, H mabouia).

1843. Pnoëpus Fitzinger, Syst. Rept., p. 106 (type, H. jaranicus=H. frenatus).

The above synonymy refers chiefly to the species occurring within our limits. For others see my "Land Reptiles of the Hawaiian Islands."

Only one species of true *Hemidactylus* has been reported from our territory thus far. Another is here recorded for the first time. They may be distinguished as follows:

al Inner digit very small, with a short sessile terminal joint, the claw of which is usually very minute; males with the femoral pores continued across the belly.

H, frenatus, p. 172.

HEMIDACTYLUS FRENATUS: Duméril and Bibron.

1836. Hemidactylus frenatus Di мёні анд Вівком, Егре́т Gén , III, р 366 (type-localities, Java and Timor)—Воттемови, Cat. Liz Brit Mus., I, 1885, р 120 Таіман fu, South Formosa Korea—Виома, Proc Phila. Acad., 1902, р. 183—Loo Choo Islands—probably Okinawa shima.

1860. Hemidactylus mornatus Hallowell, Proc. Phila Acad., 1860 p. 492 (type-locality, Okinawa shima, type, U.S.N.M. No. 7429, Stimpson, collector).

1868 Hemidaciylus longiceps Core, Pros. Phila Acad, 1868, p. 320 (type-locality, Manila, Philippine Islands.).

a From Mut, half, δακτυλος, digit.

b Proc. U. S. Nat Mus., XXI, 1899, p. 791.

c Signifying bridled, alluding to the dusky streak on the lores (frenum).

Description (figs. 167-168). Adult male; U.S.N.M. No. 34202; Ishigaki shima, Riu Kiu Archipelago; June, 1899; A. Owston, collector. Rostral squarish, broader than high, upper outer corner entering nostril, a median cleft behind; nostril between first supralabial. rostral, and three nasals, of which the upper and the lower are larger than the one between; distance from nostril to eye scarcely longer than from eye to ear-opening; diameter of eye a little more than half its distance from tip of snout; ear-opening small, oval; 11 supralabials; mental large, triangular followed by a median pair of large oblique chin-shields broadly in contact; an outer pair of equally large shields extends a short distance back of the median pair, in contact with first and second lower labials; granules of throat extending close up to the chin-shields; upper surface covered with small granules, those on occiput, supraocular and interorbital region smallest, those on lores. rostral canthus, and anterior portion of snout largest; among the granules a few isolated rounded tubercles on lower back; first digit very small, the terminal compound joint scarcely free and with a very

minute claw; six pairs of lamelle, one terminal and two basal single lamelle under fourth toe; under surface covered with small, flat, slightly imbricate





ered with small, flat, Figs 187-168. Hemidal Tylus Frenatus (Type of H. Inormatus).

scales except on throat, where the scales are reduced to small granules; a continuous series of 31 femoral pores meeting at an angle in front of anus, tail gradually tapering, cylindric toward the tip, more flattened toward the base, covered above with small scales with indication of annulation, the posterior outline of the annuli being marked by three large pointed tubercles on each side and forming longitudinal series; underside of tail with a median series of wide plates. Color (in alcohol) above pale drab gray, with faint indications of dusky mottlings and cross marks; a pale broad band from nostril through eye and over temporal region, bordered above and below by an obscure narrow dusky line; labials mottled with dusky brown; underside whitish.

Inmensions.			TR 174.
Total length			99
Snout to vent			45
Vent to tip of tail			54
Snout to ear-opening			13
Greatest width of head			9,5
Fore limb			15
Hind limb	 	 	18

The adult female (No. 34196, same locality and collector) differs chiefly in the absence of femoral pores.

Variation. The greatest amount of individual variation is seen in the number of tubercles on the back. In most specimens the tubercles are confined to the posterior half of the back, but in some examples scattered tubercles are found as far forward as the shoulder, while in others, as in the specimens described above, they are nearly absent. Sex does not seem to have anything to do with it, for we have males and females with numerous tubercles, as, for instance, Nos. 34206 and 34200, and likewise males and females almost devoid of tubercles, as Nos. 34199 and 34196.

The number of femoral pores in the males varies in the series before me between 28 and 35.

The size and mutual arrangement of the postnasals, and also of the chin-shields, are subject to some variation from what is described above; thus the outer pair of chin-shields are often excluded from contact with the first lower labial.

The reproduced tail is somewhat shorter and stouter at the base than the original one, the scales are somewhat larger and less regularly arranged, and there are no tubercles. The transverse plates on the underside are well developed, however.

Habitat -One of the most widely distributed species of geckos, which has been carried in cargoes to many distant localities. It has recently been found in western Mexico, and it occurs also in St. Helena, in the South Atlantic. From South Africa and Madagascar it extends through the various groups of islands, India, Malayan Peninsula and Archipelago, northern Australia, Philippine Islands, Hainan, southern and eastern coast of China, to Formosa, Riu Kiu Islands, and Korea

From the latter country there is a specimen in the British Museum presented by Sir E Belcher, and in the same museum several from Taiwan fu, southern Formosa. Another specimen from Formosa is in the museum at Bergen, collected by Capt. von der Ohe. It has been collected in the "Loochoo Islands," as recorded by Dr. A. E. Brown, and specimens similarly labeled are in the Hamburg Museum from Doctor Warburg (No. 1152). Doctor Lenz, March 13, 1897, collected four specimens on Iriomote Island, of the Yaeyama group (Hamb. Mus., No. 1899), and the United States National Museum has 22 specimens from Ishigaki Island, of the same group. Finally, the Science College Museum, in Tokyo, has a number of specimens (No. 40) from Miyako shima, in the same group, and a single one (No. 41) from Naha, Okinawa shima, all collected by Tashiro.

List of	s pecimens	of	Hemidactylus frenatus.
	* P	~,	

Museum.	Iuseum. No. Sex and age. Locality.		Locality.	When collected.	By whom collect- ed or from whom received.	Femor
U.S.N.M.	7429a	 Female a	Okinawa shima	Nov. —, 1854	W. Stimpson	
Do	7429 <i>b</i>	Young	Okinawa shima(?)	do	W. Stimpson (?).	· • • • •
Do	7429c	do	do	do	do	
Do	34191	Male	Ishigaki shima	June —, 1899	A. Owston	2
Do	34192	do	¹ do	do	do	2
Do	34193	do	do	'do	do	31
Do	34194	do	do	do	do	29
Do	34195	'do	do	do	do	2
Γο	34196	Female	do	do	do	
Do		l .	do	1	1	i
Do	34198	do	do	'do	do	31
Do	34199	do	 do	do	do	33
Do	34200	Female	do	do	do	
Do	34201	Male	dodo	do	do	31
Do	34202	do.b	dodo	do	do	31
Do	34203	do	do	do	do	29
Do		1	}do			
Do			do			1
Do			do	1		1
Do		1	do			
Do	34208	1	do			33
Do		l .	do		t contract the contract to the	1
Do		J.	do			1
Do			do	1		
Do			do	i		1
Do			Miyakoshima			1
Do			dodo.			1
Imp. Mus. Tokyo			Okinawa shima		i	i
		1	do		ļ.	1
			do		!	31

Type of H. inornatus (figs. 167-168).

HEMIDACTYLUS MARMORATUS a Hallowell.

1860. Hemidactylus marmoratus Hallowell, Proc. Phila. Acad., 1860, p. 491 (typelocality, Loo Choo).—Boulenger, Cat. Liz. Brit. Mus., I,1885, p. 113.

The type has apparently been lost, and no species of *Hemidactylus* answering to Hallowell's description, which is very defective, to say the least, has been brought from the Riu Kiu Archipelago. Under these circumstances it may be useful to reproduce here Hallowell's original description in full, the obvious errors being corrected, as explained in the footnotes.

Description.—Mental plate pentangular, small; a transverse row of plates immediately behind the mental and first infra-labials; the two middle much larger than the lateral ones; behind these several

b Description, p. 173.

cSci. Coll. No. 40

a Signifying marbled; with dark markings like the veins in marble.

series of unequal scales, larger than those upon the throat; eleven supra-labials on each side; rostral plate pentangular, much broade than high, presenting an angle posteriorly; scales upon the muzzle and in front of the orbits, nearly equal, small; head covered with small granulations; five rows of very small circular tubercles on each side of the back above; a row of seven pores in front of the anus. Color grayish, marked all over with black; abdomen white; chin and throat white, marked with brown.

Dimensions.—Length of head 7 lines; greatest breadth 4½ lines; length of head and body 1 inch 8 lines.

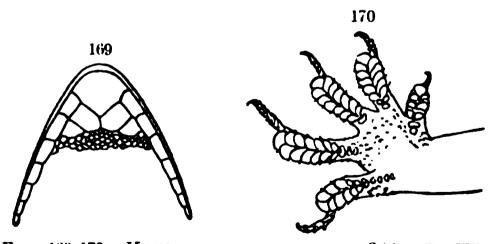
Habitat.—Loo Choo. One specimen.

It is just possible that Hallowell had before him a Gekko japonicus so shriveled or mutilated that the subdigital lamellæ appeared to be divided.

HEMIDACTYLUS BOWRINGII c (Gray).

- 1845. Doryura bowringii Gray, Cat. Liz. Brit. Mus., p, 156 (type-locality unknown; types in Brit. Mus.).—Hemidactylus bowringii Boulenger, Cat. Liz. Brit. Mus., I, 1885, p. 139, pl. xII, fig. 2 (Burma; Northern and Central India); Fauna Brit. India, Rept., 1890, p. 93 (Eastern India, Burma, and Tenasserim).
- 1853. Leiurus berdmorei Вгутн, Journ. Asiat. Soc. Bengal, XXII (р. 646) (typelocality, —).
- 1860. Hemidactylus pumilus Hallowell, Proc. Phila. Acad., 1860, p. 502 (typelocality, Hongkong).
- 1872. Hemidactylus coctæi Guenther, Ann. Mag. Nat. Hist. (4), IX, Jan. 1872, p. 86 (part; not of Duméril and Bibron).—Mueller, Kat. Amph. Rept. Mus. Basel, 1878 (p. 637) (Lilong and other localities in province of Canton).—Boettger, Offenbach. Ver. Naturk. 24-25 Ber., 1885, p. 138.

Description.—Adult male; U.S.N.M. No. 34188; northern Formosa; June 23, 1903; A. Owston, collector (figs. 169-170). Rostral squarish,



Figs. 169-170.—Hemidactylus bowringii. 3 × nat. size. 169, chin; 170, underside of foot. No. 34188, U.S.N.M.

broader than high, with a median cleft behind, the upper corners entering the nostrils; a pair of internasals separated by a small scale; nostril surrounded by first supralabial, rostral, internasal and two small scales; eye equidistant from nostril and ear-opening; supra-

labials 12 on left side, 10 on right; mental large, triangular, or rather subpentagonal, followed by a median pair of large chin-shields, on the side of which a lateral pair of much smaller shields which

^aThe last paragraph in the original text follows immediately after the first sentence describing the mental plate; it is evidently misplaced and must be inserted in the position here given to it.

b The original text has "ventral," evidently a slip for rostral.

c Named after Charles Bowring, esq., who presented the types to British Museum.

do not extend backward beyond the median pair; granules on throat immediately join the chin-shields; upper surface covered with uniform granules (without trace of interspersed tubercles) those on vertex and on supraocular region smaller, those on shout and lores larger; first digit well-developed with a well-developed, free, and raised terminal joint provided with a full-sized claw; six lamella, of which three in pairs, under first toe; ten lamellæ, of which six in pairs, under fourth toe: throat covered with uniform granules, rest of under surface with small, rounded, imbricate scales; a well-developed series of 13 pores on each femur, not meeting on the middle of the abdomen, nor reaching the knee joint; tail subcylindric, more depressed near base, tapering, covered with uniform small scales of about the same size as the large granules on the snout; underside of tail covered with a median series of wide transversal plates Color (in alcohol) above dark drab gray a with obscure brown marblings; scarcely discernible dark band from lores through eyes, above ear-opening to side of neck, and a similar one on parietal region; underside whitish,

Dimensions		
Total length		mm. 88
Snout to vent .		50
Vent to tip of tail creproduced		38
Snoul to ear opening		13
Greatest width of head		 10
Fore lumb		15
Hind limb		20

The adult female (U.S.N.M. No. 34211; Ishigaki Island, Riu Kiu; Owston collection) differs in the absence of femoral pores.

The most marked deviation, due to individual variation, from the specimen described above is the presence of a second lateral pair of chin-shields, smaller than the others, but well differentiated.

Remarks—The specimens here recorded from Formosa and Riu Kiu have not been compared with Indian specimens, but they agree so completely with the published descriptions that I have no doubt that they are correctly identified—The well-developed inner toe with long terminal free phalanx and large claw, the series of 13 to 14 femoral pores on each side interrupted on the middle of the abdomen, and the tail devoid of tubercles indicate H. bowringir beyond a doubt.

The fact that this species has hitherto been recorded only from India, Burma, and Tenasserim is of no weight now, since Dr. Jean Roux, curator of the herpetological collection in the Basel Museum, informs me that the *H. coctai* recorded by Mueller in the catalogue of that museum as from "Liolong and other localities in the province of Canton," China, is in reality *H. howringii*, a fact of which he has assured himself by repeated and careful examinations and comparisons with allied species.

Habitat.—This species is known to inhabit the mainland of India, Burma, and Tenasserim, and as shown above, it is now recorded from the province of Canton in China. A single specimen collected in June, 1899, in "northern Formosa" and obtained from Mr. Alan Owston, is now in the United States National Museum. It is the first record of this species in the island.

Another specimen, a female, from Ishigaki shima, of the Yaeyama group, Riu Kiu Archipelago, was found among a lot of 22 specimens of *H. frenatus*. This species is probably much rarer than *H. frenatus*, or has different habits which result in its being more rarely caught.

U. 8. N. M. No.	Sev.	Locality.	When collected.	By whom collected or from whom received.	Femoral pores.
34188 34211	Male 4 Female	North Formosa	June 23, 1903 June —, 1899	A. Owstondo	13

List of specimens of Hemidactylus bowringii.

Genus COSYMBOTUS a Fitzinger.

- 1836. Platyurus Oken, Allgem. Naturgesch., VI, p. 641 (not Platurus Latreille, 1802).
- 1843. Cosymbotus Fitzinger, Syst. Rept., p. 104 (type, H. platyurus).
- 1858. Crossurus Girard, Herpet. U. S. Expl. Exped., p. 281 (same type; not of Wagler 1830).
- 1864. Nycteridium Guenther, Rept. Brit. India, p. 111 (same type).

COSYMBOTUS PLATYURUS b (Schneider).

- 1792. Stellio platyurus Schneider, Amph. Physiol., II, p. 30 (no type-locality given; type in coll. Rebelt).—Hemidactylus platyurus Boulenger, Cat. Liz. Brit. Mus., I, 1885, p. 143 (India, South China, Malay Peninsula and Archipelago; Philippines).
- 1798. Lacerta platyuros Donndorf, Zool. Beytr., III, p. 133 (emendation).
- 1802. Lacerta schneideriana Shaw, Gen. Zool., III, Pt. 1, p. 1278 (substitute name).
- 1829. Gecko marginatus Cuvier, Règne Anim., 2 ed., II, p. 54.
- 1864. Nycteridium schneideri Guenther, Rept. Brit. India, p. 111 (emendation).

Description.—Adult male; Bergen Museum; Formosa; von der Ohe, collector. Rostral broader than high, in contact behind with two supranasals and a small scale between the latter; first supralabial in contact with a postnasal and reaching nostril; nostril between rostral, first supralabial and three smaller scales behind and above; 10 supralabials bordered above by a series of enlarged granules; scales on top of head granular, somewhat larger on snout, still larger on the loreal region; eye nearer ear-opening than nostril; large, about two-thirds the distance from ear-opening, which is small, about the size of one of the larger supralabials; mental shield large, penta-

a Description, p. 176; figs. 169-170.

a From $\kappa o \delta v \mu \beta \omega r \dot{o} s$, fringed, tasseled. b From $\pi \lambda \alpha r \dot{v} s$, flat; $\delta v \rho \dot{\alpha}$, tail.

gonal, in contact behind with first lower labials and one pair of large postmentals, which are followed by another pair of equal size not in contact with each other; 7 larger lower labials which are bordered by a series of enlarged granules; body and legs above covered with small uniform granules; body and extremities below, as well as upper surface of feet, covered with larger imbricate scales, those on throat and underside of lateral fold, however, smaller, scarcely larger than the dorsal granules; from axilla to groin a thin skin flap about 2 mm. wide, and a similar fold along the posterior edge of thigh and tibia; five pairs of plates under shortest toe and eight pairs under longest: four toes nearly half webbed, hallux free; tail flat, with sharp, almost fin-like, and servated edges, and a strong basal constriction; it is covered with somewhat pointed imbricate scales and underneath with a median series of about 40 wide subcaudal plates; at the basal origin of the flap-like lateral expansion of the tail a number of welldifferentiated clongated spines; femoral pores continuous from knee across the belly, 20 on each side. Color (in alcohol) above drab with indistinct marblings of darker and lighter color; a distinct dark band from loreal region through lower part of eye and above ear to shoulder: below whitish.

	Dimensions.		
Total length Snout to vent		 	mm. 88 46
Vent to tip of tail.			42 13
Snout to ear-opening. Greatest width of head			9 5
Fore leg, from axilla Hind leg, from groin			16 23

Remarks. From the above description it will be seen that the Formosan specimen agrees in all essential points with those from other localities. The second pair of postmentals is unusually large, but I have before me (in Bergen Museum) a specimen from Luzon, in the Philippines, which is halfway in this respect between normal specimens and the Formosan specimen.

Habitat. This gecko is widely distributed from India and the East Indian Archipelago to southern China and the Philippines. So far as I know it is here recorded from Formosa for the first time. It was collected in the early sixties by Captain von der Ohe, from Bergen, who during his eastern cruises collected extensively for the museum in his native city.

List of specimens of Cosymbotus platyurus.

Мивеци	85	Stern	Logarita	When col- neted	By what collected
Berken		Malea	Femesa		Capt, vos der Ohe

Genus PEROPUSª Wiegmann.

1835 Perapus Wiegmann, Nova Acta Acad Leop Carol XVII, Pt. 1, p. 238 (type, H mutdatus)

1843 Partyloperus Fitzinger, Syst. Rept., p. 103 (type, II caragatus)

1845 Peripia Gras Cat Lar Brit Mus. p. 158 (type, H peronii=matilatus).

1883 (halinocnemis Degès, La Naturaleza, VI, p. 312 type, H. nacarri=mutilatus)

1883 Spasmocnemix Dr GRs, La Naturaleza, VI, p. 312 same type)

Wiegmann's genus *Peropus* of 1835 antedates that of Lay and Bennett for a genus of fishes, as the Zoology of the *Blossom*, in which the latter occurs for the first time, was not *published* until 1839.

PEROPUS MUTII ATUS Wiegmann.

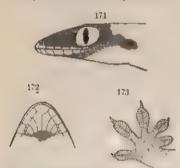
1834. Hemidactylus matilatus Wiegmann, Herpet, Mcx. I, p. 54 (type-locality, Manda (corrected for H pristingus, op. cit. p. 20, Hemidactylus Peropus mutilatus Wiegmann, Nova Acta Acad, Leop. Carol. XVII, Pt. 1, 1835. p. 238. Gebyra mutilata Bollenger, Cat. Liz. Brit. Mus. I, 1885. p. 148. Mascarene Islands to Mexico. Peropus mutilatus Girando, Herp. U. S. Expl. Exped., 1858. p. 277. Philippinest. Steineger, Proc. I. S. Nat. Mus. XXI, no. 1174, 1899. p. 796 (Hawaiian Islands).

1857. Dartyloperas insulenses Girario, Proc. Phila. Acad., 1857. p. 195, author's separate, p. 5. type heality, Sandwich Islands.

1883 Hemidactylus naturei Ducks, La Naturaleza, VI, p. 311, pl. viia etypebeality. Tangametenara, Mechoacan, Mexico.

For complete synonymy see Stejneger, Land Reptiles of the Hawaiian Islands, d

Description (figs. 171-173).—Adult female; Bergen Museum; Formosa; von der Ohe, collector. Rostral broader than high, with a



Figs. 171-173. Peropus mutilatus, 2 × NAT, SIZE, 171, SIDE OF HEAD, 172, CHES; 173, UNDERSIDE OF FOOT. NO. 2085, U.S. N.M.

median cleft above, in contact with two supranasals and a minute granule between the latter; first supralabial in contact with the lower postnasal and reaching nostril; nostril between rostral, first supralabial and three scales behind and above, the upper one of which is large and in contact behind the rostral with the corresponding scale of the other side; 9 supralabials; scales on top of head finely granular, slightly larger on snout; eye equidistant from nostril

and ear-opening large, more than two-thirds its distance from ear-opening which is moderate, somewhat larger than one of the largest

^a From $\pi\eta\rho\sigma\varsigma$, mutilated, and $\pi\sigma\dot{\epsilon}\varsigma$, foot

b Liter, Gaz, and John Belle Lett., London, no. 1179, p. 542, Aug. 24, 1839, where, according to T. S. Palmer. Index Gen. Manur. p. 16. it is first mentioned in the list of new books. A review printed in Mag. Nat. Hist., London, March. 1840, begins thus, "The long-looked for and long-despaced of zoology of Beechey's Voyage is at last before us.".

6 Signifying mutilated.

d Proc. 1. S. Nat. Mus., XXI, 1899, p. 796.

supralabials; mental shield rather small, triangular, followed by six chin-shields in one transverse series, their posterior outline forming together a straight line, the median pair being large, elongate pentagonal, the others gradually smaller toward the sides, the largest pair longer than diameter of eye; 9 large lower labials; body and legs above covered with small uniform granules like those on head: throat with granular scales of same size as those on back. those on rest of under surfaces, including those of the legs, larger, distinctly imbricate, and rounded behind; on the flanks a barely indicated longitudinal fold, and a somewhat better developed fold along the posterior edge of thigh and tibia; toes slightly webbed at base; about 8 pairs of lamellæ under longest toe and 6 under the shortest; tail (reproduced) rather flat, with sharp, finely serrated lateral edge, covered, with small, somewhat pointed, imbricate scales above and with a median series of wide plates bordered on each side by a somewhat irregular series of enlarged scales: about 5 mm, from the base the tail has a distinct lateral indentation; no femoral pores Color (in alcohol) above browinish drab with faint indications of darker marblings, below whitish.

	Dime	naiona.		
				777.77).
Total length .			 	60
Snout to vent				33
Vent to tip of tail.				27
Shout to car-opening				8.5
Greatest width of head				7
Hind log, from groan				12

Remarks. The specimen agrees in most particulars with other specimens of this species.

The males have femoral pores in a continuous angular series across the abdomen, 14 to 19 on each side.

For further remarks as to variation, etc., see Proceedings United States National Museum, XXI, 1899, p. 798.

Habitat. Irregularly distributed over various islands and coasts in the Indian Ocean, from the Mascarenes and Seychelles to the Philippines. This species seems very easily transported in ships, as evidenced by an apparently recent colony in western Mexico, and another in Hawaii. Its occurrence in Formosa and the Riu Kius is therefore not surprising. It was collected in Formosa during the early sixties by Capt. von der Ohe, who brought a single specimen to the museum at Bergen, Norway. This is the only record of its having been taken in Formosa.

Another specimen is in the Hamburg Museum (Saur., No. 1151), collected by Doctor Warburg in the Riu Kius, without further data.

List of specimens of Peropus mutilatus.

Museum.	No.	Sex.	Locality.	When col- lected.	By whom collected.
		` '	Manila, P. I		
			Riu Kiu Islands		
	a Figs.	171–173.	<u> ър</u>	escription,	

Family AGAMIDÆ.

Lizards with a thick villose tongue and acrodont teeth; no large symmetrical plates on head or abdomen.

Distributed over the tropical and subtropical regions of the Old World, principally the Indian region; they are absent in Madagascar. The family contains both terrestrial and arboreal species, the former usually with a depressed body, the latter of a compressed shape. Some are insectivorous, others again herbivorous.

Only one genus occurs in Japanese territory.

Genus JAPALURA a Gray.

- 1853. Japalura Gray, Ann. Mag. Nat. Hist. (2), XII, p. 387 (type, J. variegata).
- 1853. Biancia Gray, Ann. Mag. Nat. Hist. (2), XII, p. 387 (type, B. niger=J. variegata).
- 1860. Diploderma Hallowell, Proc. Phila. Acad., 1860, p. 490 (type, D. polygonatum).
- 1863. Iapalura Swinhoe, Ann. Mag. Nat. Hist. (3), XII, p. 225 (emendation?).
- 1890. Pelturagonia Moquard, Le Naturaliste, XII (p. 144) (type, P. cephalum).

Species of this genus occur from the Himalayas and eastern Bengal through Assam to western China. One species each is known from Borneo, Formosa, Botel Tobago, and the Riu Kiu Archipelago.

KEY TO THE JAPANESE SPECIES OF JAPALURA.

- a Width between outer superciliary edges at center of eye exceeding length of third toe, without claw.

As already indicated by Boulenger, Japalura swinhonis, from Formosa, and J. polygonata, from the Riu Kius, are very closely related, but the recent acquisition of a large series of specimens from Ishigaki shima shows a relationship even more close than was supposed

a Derivation obscure; possibly the J is a misprint (?) for H, from $\Delta\pi\Delta\lambda\delta\varsigma$, fine, and $ov\rho\alpha$, tail.

by him. Not that the two forms are not distinct. On the contrary, there are quite a number of distinctive characters, but it is exceedingly difficult to express them in words and it is doubtful whether there is any single character which will separate the two forms in all cases.

Boulenger found the difference to be chiefly one of proportions and coloration. He stated that J. polygonata "differs in having the tibia constantly shorter than the skull, fewer labials as a rule, and in coloration," the inference being that in J. swinhouis the tibia is constantly at least as long as the skull. Unfortunately, however, the inference is not borne out by our material, since in several of the Formosa specimens of J. swinhonis, thus in U.S.N.M. Nos. 34084 and 34089, both old males, the tibia is decidedly shorter than the skull, as much so as in several Ishigaki shima specimens. It is true, nevertheless, that the Formosan form has the hind limbs longer as a rule. and this is more especially marked when we examine specimens of the male sex, since the females as a rule are somewhat more shortlegged. J. swinhouis has a relatively longer fourth toe, the latter extending farther beyond the third than in J. polygonata, but the difference is so small that it defies a definite expression which would make it possible to use it as a criterion in a "key ' for identification. A better result is obtained if we compare the length of the fourth toe (without claw) from the base of the third with the distance from the center of the eye to the tip of the snout. In most cases J. swinhous has the fourth toe decidedly longer than this distance, while in J. polygonata it is usually equal or smaller.

The number of supralabials offers no tangible diagnosis. There are 7 or 8 labials in about equal proportion among over 20 Ishigaki shima specimens, not one with six.

The coloration furnishes possibly the best distinction, at least among the adults. While there are several of the adult males of the Ishigaki specimens which show a whitish lateral band quite distinctly and thus differ from the uniform green color of some of the Okinawa adult males, there is one color character in which all the old Formosan specimens agree, viz, in having the throat dark with large distinct white spots. This pattern is not found in any of our Riu Kiu specimens in which the throat is whitish more or less suffused with rustred, uniform in the males but in the females marked with irregular longitudinal dusky lines converging posteriorly. In the latter there is also a more or less conspicuous longitudinal pale line under the eyes parallel with the upper hp, while in the Formosan specimens there are distinct blackish lines running from the eye to the lip.

There are several other minor characters of more or less constancy which are real enough though hard to express. Thus, the outline of the head is somewhat different especially when viewed from below,

^o Proc Zool See London 1887, p 146.

inasmuch as in J. swinhonis the rami of the jaw are more convex than in J. polygonata in which they are more straight. In the latter the ventral scales are possibly a trifle larger, but I have been unable to establish a ratio. It also seems as if the spines of the nuchal crest were more conical and pointed, while in J. swinhonis they are wider and more rounded toward the apex.

When establishing J. mitsukurii, I had only one Formosan specimen for comparison. The latter was then unbesitatingly taken for a typical J. swinhonis, but the 17 specimens from Formosa since received put a somewhat different aspect on the whole question. The single specimen referred to shows such aberrant characters that I have become dubious as to its Formosan origin, or if it really comes from that island whether it may not represent a different species, questions which will be discussed farther on under the head of J. swinhonis. An examination of the large series of typical specimens of the latter now shows that the principal character upon which I relied for the diagnosing of the Botel Tobago form, viz, the absence of a specially differentiated series of larger scales between the eye and the upper labials, does not hold. But there are other differences separating it from both the other forms. In coloration J. mitsukurii agrees most with J. swinhonis, but the throat is much paler and the white markings on it, instead of being isolated roundish spots, form more or less distinct bands across the throat. In some of its proportions it also comes close to J. swinhonis. Thus, for instance, the distance from center of eye to tip of snout is very much less than the length of the fourth toe from the base of the third. Both feet and tail are longer On the other hand, the head is much parrower and its lateral outline much straighter, in this respect resembling f. polygonata, only exceeding it. This parrowness of the head compared with the elongation of the toes furmshes a good character for distinguishing J. mitsukurii.

JAPALURA SWINHONIS" Guenther.

1864 Japalura saunhouse Guentherr Rept Brit India p. 133, pl. xiv, fig. B. type-locality, Tamsai, Formosa type in Brit Mus., Swinhoe collector, see Ann. Mag. Nat. Hist. 3. XII, 1863, p. 225. Boulderger, Cat. Liz. Brit. Mus., I, 1885, p. 309 (Formosa), Proc. Zood. Soc. London, 1887, p. 146. Mueherr, Verh. Naturf. Ges. Basel, VIII, Pt. 2, 1887, p. 294 (southern Formosa). Steinfolder, John, Sci. Coll. Tokyo, XII, Pt. 3, 1895, p. 218 (Ta.pa. Formosa).

1885, Japalara swindow Roetteger Offenbach Ver Naturk 24-25 Ber , 1885, p. 140 ensindation)

⁶ Named for Robert Swinhos, then British consul in Formesa, known from his investigation of the Chinese and Formosan finans. B. Was bern in Calcutta, September 1, 1836, and died in London, October 28, 1877. He was in the British consular service in China from 1854 to 1873.

A single adult female specimen (Sci. Coll. Mus. No. 22) said to have been collected by Mr. Tada at Taipa, Formosa, during July, 1896, has been recorded by me as Japalura swinhoms with the statement that "it agrees well with the published description." At that time I had no other Formosan specimens for comparison, and only three from Okinawa. The fine series of typical J. swinhowis from Formosa, and of J. polygonata from Ishigaki shima, now at hand, make the specimen in question appear in a somewhat different light. In fact, it presents so many peculiarities differing from all the three forms known from our territory that I do not know whether to regard it as an individual freak or a new species, in which case one might be tempted to question the correctness of the alleged habitat.

It has the dark dorsal cross-bars of the Formosan J. swinhonis as well as the white lateral longitudinal band, only the latter is unusually wide, but the throat is entirely uniform white, showing none of the characteristic pattern found in all our adult specimens of the latter. In addition it has the uninterrupted white longitudinal streak found in

the J, polygonata of the Yaeyama group.

The proportions are very different from those of the normal Formosan specimens, and would even be considered extreme among the J. polygonata. The hind legs are exceedingly short, particularly the tibia, which is not longer than the distance from tip of snout to the posterior edge of the orbit, consequently very much shorter than the skull. The third toe, without claw, equals only three-fourths of the width between the outer superciliary edges. The distance from center of eye to tip of snout is much greater than the fourth toe measured from the base of the third. If the hind leg be carried forward along the side, the tip of the longest toe does not reach farther than the posterior edge of the (concealed) tympanum. It has seven supralabials. In addition to the above characters it has a row of enlarged scales from under the eye to the nasal, separated from the labials by a row of very narrow ones. Some of these enlarged scales are as large as some of the supralabials and three times as large as the other scales below and in front of the eye. Finally there is a very distinct row of enlarged submalar scales along the entire length of the lower edge of the mandible. In the other specimens, especially those from Formosa, only the two or three scales on each side of the mental are thus enlarged. In some of the Ishigaki shima specimens. however, a tendency to such a submalar series may be traced, but the full development as shown in the Taipa specimen seems to be unique.

It does not seem probable that the above deviations from the typical Formosan form can be due to individual variation of the

⁹ Journ. Sci. Coll. Tokyo, XII, Pt. 2, 1898, p. 218

ordinary kind. It may represent a freak or a sport, but in view of the many points in which it differs, this explanation does not appear plausible. That two separate species so closely related should occur in the same locality in Formosa would scarcely be accepted by herpetologists without incontrovertible proof. The question then naturally suggests itself whether by some accident a wrong locality may not have been assigned to it. To the neck of the specimen a large paper tag is firmly tied bearing the following inscription in Latin letters, "No. 22, Taipa, Formosa, 7-96," but there are good reasons for believing that this is not the original collector's field label. However, if not from Formosa proper, where could it have come from? The specimen, as we have seen, is not identical with any from the middle or southern groups of the Riukius. On the other hand, that it was part of the collection made by Mr. Tsunasuke Tada seems unquestionable. He collected in Formosa, Botel Tobago, and the Pescadores Islands. Our specimen agrees even less with J. mitsukurii, from Botel Tobago, than with the other two forms. Could it, then, possibly have come from the Pescadores or any other outlying island?

The question can not be decided now, and is thus left for future

explorers in that region.

Description. Adult male; U.S.N.M. No. 34082; northern Formosa; June 23, 1903; Owston collection, Rostral low, separated from nasal by one scale; nostril round, in a single, somewhat swollen nasal, which is in contact with first supralabial; canthus rostralis very sharp, covered with about five scales; superciliary ridge interrupted by a deep notch at the posterior end of the orbit, followed by a single low spine; various isolated spines on occiput and temporals; eight supralabials, eighth very long and narrow; all head scales wrinkled and keeled; back covered by imbricated keeled scales of at least three different sizes, a low nuchal and dorsal crest of pointed scales, those of the former slightly higher, seven in number, flattened, conical, the latter triangular, 33 in number; a similar crest on the base of the tail, the three crests being continuous, the spines over the shoulder and between the hind legs, however, being lower than the others; scales on flanks not much different from dorsals, except those back of the axilla and near the groin which are much smaller; scales on underside strongly imbricate and keeled, pointed but not mucronate; digits underneath with a double series of spiny keels; third and fourth finger nearly equal; fourth toe, without claw, from base of third considerably longer than distance from center of eye to tip of snout; third toe, without claw, from base of fourth, shorter than distance between superciliary edges at center of eye; distance from upper side of knee of hind leg, bent at right angles, to tip of

longest toe without claw, longer than distance from tip of shout to inner angle of elbow; tail slightly compressed, swollen at base, covered above and below with imbricate, keeled and pointed scales. Color (in alcohol) above brownish, with a broad irregular, blackedged, pale gray band on each side of back, connected across the back by several indistinct pale chevron bands pointing backward, these chevrons occupying corresponding series of enlarged scales; head with numerous black spots, which on temples and under eye form interrupted lines radiating from the latter, throat and chest dark slate gray, the former with large, rounded, white spots; rest of underside pale gray; tail with alternating broad bands of pale gray and dark brown.

Dimensions			
T. tal launth			78.78 02.6
Total length	•	•	236 70
Vent to tip of tail			166
Snout to center of eye			12
Greatest width of head			15 5
Fore leg			35
Hind leg			62

The females differ chiefly in lacking the basal swelling of the tail underneath, in the less development of the nuchal and dorsal crests, and in having the throat brown with white spots instead of dark slate gray.

The young have the throat uniform whitish or with faint gray

marblings,

Variation.—The variation in the size and relative position of the head scales is considerable but has no immediate significance in so far as the identification of the species is concerned. The extent of individual variation of proportions and coloration has been alluded to above under the general discussion of the related forms (p. 183).

Habitat. This species, which is restricted to the main island of Formosa, was first discovered at Tamsui by Robert Swinhoe, whose name it bears. It has since been obtained by most collectors in various parts of the island, and judging from the large number received by Mr. Owston it does not seem to be rare even in the northern part as formerly supposed. It is replaced by closely allied forms in the adjacent islands, thus by J. polygonata in the Riu Kius and J. mitsukurii in Botel Tobago.

On the Chinese mainland there is a nearly related species, Japalura yunnanensis, which occurs from western Yunnan to Ichang, on the Yangtse Kiang, and north into the province of Shen-si, whence we have a specimen from the Chin-ling Mountains collected by Dr. E. Blackwelder (U.S.N.M. No. 35524).

List of specimens of Japalura swinhon	List
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Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected or from whom received.
J.S.N.M	34082	Male a	Northern Formosa	June 23,1903	A. Owston.
Do	34083	do	do	do	Do.
Do	34084	do. b	do	do	Do.
Do	34085	do	do	do	Do.
Do	34086	do	do	do	Do.
Do ,	34087	do	do	do	Do.
Do	34088	do	do	do	Do.
Do	34089	do.b	do	do	Do.
Do	34090	Female	ido	do	Do.
Do	34091	Male	do	do	Do.
Do	34092	Female	ldo	do	Do.
Do	34093	Male	do	do	Do.
Do	34094	do	do	do	Do.
Do	34095	Female	[!] do	do	Do.
Do	34096	Young	do	do	Do.
Do	34097	do	do	do	Do.
Do	34098	do	do	do	Do.
ci. Coll., Tokyo	22	Female c	Taipa, Formosa	. Sept., 1896	T. Tada.

a Description, p. 186.

JAPALURA POLYGONATA a (Hallowell).

Native name "ATAKAH."

Plate XIV.

1860. Diploderma polygonatum Hallowell, Proc. Phila. Acad., 1860, p. 490 (typelocality, Kerama shima, "Amakarima," Riu Kiu Archipelago; type U.S. N.M. No. 12203).—Japalura polygonata Guenther, Rept. Brit. India, 1864, p. 134.—Boulenger, Cat. Liz. Brit. Mus., I, 1885, p. 310; III, 1887, p. 493 ("Loo Choo"); Proc. Zool. Soc. London, 1887, p. 146, pl. xvii, fig. 1b ("Loo Choo Islands.").—Orada, Cat. Vert. Japan, 1891, p. 71 (Okinawa shima).—Boettger, Ber. Senckenberg, Naturf. Ges., 1888, Abhandl., p. 187 (O-shima, Riu Kiu); Kat. Rept. Mus. Senckenberg., I, 1893, p. 46 (O-shima); Offenbach. Ver. Naturk. 33-36 Ber., 1895, p. 107 (Okinawa shima).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 860; author's separate, p. 11 (Okinawa).—Brown, Proc. Phila. Acad., 1902, June 11, p. 184 ("Loo Choo Islands.").

This species agrees so closely with the preceding one that a detailed description is unnecessary. The differences, which consist chiefly in the shorter legs and longer and narrower head of J. polygonata, have been sufficiently indicated above under the general discussion of the genus (pp. 182-184).

The colors of the Okinawa shima specimens are said to be green in life. Thus Doctor Stimpson in his manuscript catalogue describes the type as being "dark green, back shaded, and tail annulated and still darker." In the alcoholics there are distinct traces of the dorso-lateral pale band as well as the pale line under the eye.

b P. 183.

cSee pp. 184, 185.

[&]quot; Frun rodinard, with many angles, referring to the polygonal scutes of the head.

A Reproduced in this work on Plata YIV.

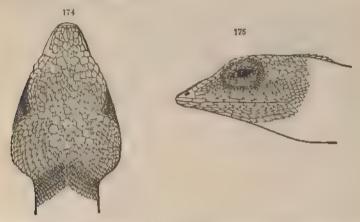


JAPALURA POLYGONATA, FROM BOULENGER FOR EXPLANATION OF PLATE SEE PAGE 554.



In the specimens from Ishigaki shima there are indistinct dark cross bands on the back. The males have the throat more or less uniform pale brownish gray, but in the females it is more whitish with irregular though distinct reddish brown lines running obliquely from the sides backward toward the median line. The coloring of the throat is therefore very different from what it is in J. swinhonis.

Dimensions.—Adult male; U.S.N.M. No. 12203; Kerama shima, Riu Kiu; type (figs. 174-175).



Figs. 174-175 – Japalura Polygonata $2 \times$ nat. size. 174-top of Head, 175, side of Head. No 12203, US N M

Total length (tail defective	 mm. 189
Snout to vent	66
Vent to tip of tail defective)	123
Snout to center of eye	11
Greatest width of head.	15
Fore leg	
Hind leg	 55

A full-grown male, with perfect tail, U.S.N.M. No. 34102, from Ishigaki shima measures 61 mm. from snout to vent, and 152 mm. from vent to tip of tail; total length 213 mm.

Habitat.—Originally described from a single specimen collected by the North Pacific Exploring Expedition on "Amakarima" Island, i, e. Kerama shima, opposite Okinawa shima, this species has since been found common on the latter island by Doctor Fritze and by Mr Tashiro. The Science College in Tokyo has several specimens (No. 26) collected there by the latter, two of which have been presented to the United States National Museum. Mr. Pryer's specimens, now in the British Museum, reported upon by Boulenger probably also came from Okinawa.

Doctor Boettger records a specimen presented to the Senckenberg Museum by Maj. H. von Schoenfeldt as from O-shima. From the Yaeyama group the United States National Museum has a fine series collected on Ishigaki shima by one of Mr. Owston's men, and the Science College Museum in Tokyo has three specimens from Miyakoshima (No. 27) and one from Iriomote shima (No. 32), all collected by Tashiro in 1887.

List of specime	ns of	Japalura	polygonata.
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U.S. N.M. No.	Sex.	Locality.	When collected.	By whom collected or from whom received.
2203	Male a	Kerama shima	Apr. —, 1855	North Pac. Expl. Exp.
4099	do	Ishigaki shima	 	A. Owston.
4100	do	do		Do.
4101	do	do		Do.
4102	do. b	do		Do.
4103	do	do		Do.
4104	do	do		Do.
4105	do	do		Do.
4106	do	do		Do.
4107	Female	do		Do.
4108	do	do	· · · · · · · · · · · · · · · · · · ·	Do.
4109	Male	do	• • • • • • • • • • • • • • • • • • • •	Do.
4110	do	do	!	Do.
4111	do	do		Do.
4112		¹ do		Do.
4113	Female	do:	1	Do.
4114		do		Do.
4115	1	do		1
4116	1.	do	1	
4117	ŧ.	do	!	
4118		do		Do.
6519	(c)	Okinawa shima	1	!
6520	(c)	do		

a Type, p. 189, figs. 174-175.

JAPALURA MITSUKURIIa Stejneger.

1898. Japalura mitsukurii Stejneger, Journ. Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 218 (type-locality, Botel Tobago Island; type, U.S.N.M. No. 36505; T. Tada, collector).

Japalura mitsukurii differs from J. swinhonis chiefly in proportions and coloration. Thus, the head, and especially the snout, is longer and narrower; the hind legs are somewhat longer, and the tail very much so. As a rule, the scales are somewhat smaller, with less contrast between the extremes, but the nuchal and dorsal crests are better developed, the latter continuous with the caudal, the keels on underside sharper and the scales more pointed. The coloration

b Р. 189.

c Sci. Coll. No 26.

a Dedicated to Prof. Kakichi Mitsukuri, of the Imperial University of Tokyo.

b Thus, as a rule, the nasal is smaller and separated from the supralabial by a narrow scale, while in *J. swinhonis* they are as often in contact. The percentage is not great enough to make this character available for diagnostic purposes.

is marked by about seven dark bars across the back separated by narrow pale cross stripes, which combine with the strongly defined light dorso-lateral band into a ladder pattern; the throat in the males is pale bluish (in alcohol) with large whitish spots, which form about three broad bars across the throat; the sides below the dorso-lateral band are dark with numerous whitish spots; the white longitudinal stripe under the eye is conspicuous, but mostly crossed by narrow black lines radiating from the eye.

For further discussion of this form see previous remarks under the genus (p. 184). I may also refer to the remarks accompanying my original diagnosis of the species, but it should be noted that the comparison there made was chiefly with the abnormal female specimen alleged to have come from Taipa and described above, p. 185.

Dimensions.—Adult male; type, U.S.N.M., No. 36505; Botel Tobago Island, May, 1899; T. Tada, collector.

	mm.
Total length	. 289
Snout to vent	. 76
Vent to tip of tail	. 213
Snout to center of eye	. 14
Greatest width of head	. 15
Fore leg	. 39
Hind leg	. 70

Habitat.—This form is only known from the island of Botel Tobago, where, according to Mr. Tada, it is abundant.

T ' ' /	· · · · · · · · · · · · · · · · · · ·		T 1		
1 10t At	0 Y1444 131 431 0	α	IA NAIN	***	for the trace
IIII OI	specimens	<i>() </i>	. I W DULLU	I CL III L	LAILKULLLE
	~ p ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	``J	O P		

No.	Sex.	Locality.	When collected.	By whom collected.
36505	Male a	Botel Tobago Island	May -, 1899	T. Tada.
36506	Female	do	do	Do.
24 a	Male	do	do	Do.
24 b	Female	do	do	Do.
24 c	Male	do	do	Do.
24 d	do	do	do	Do.
24 e	do	do	do	Do.
	36505 36506 24 a 24 b 24 c 24 d	36505 Male a	36505 Male a Botel Tobago Island 36506 Female do do do do	36505 Male a Botel Tobago Island May -, 1899

a Type, p. 191.

Genus ---?

Species ——?

The young Agamoid lizard designated by Hallowell (Proc. Phila. Acad., 1860, p. 491) simply as "Otocryptis," though practically admitting that it does not belong to Wiegmann's genus, is still in the museum (No. 12252). When Hallowell wrote his notes on this specimen, it was already "much mutilated and otherwise injured," and the intervening 47 years have not improved its condition. In fact, several

of the characters noted by him are now obliterated. Yet, what is left seems to show that the specimen does not belong to any now recognized genus and species, and also that Hallowell's description, which I reproduce verbatim below, is fairly good.

The dentition is now the most prominent feature, the comparatively enormous tricuspid molars standing out in bold relief. They are eight in number on each side in both jaws, gradually increasing in size backward; in the upper jaw there are, besides, three "incisors," the median largest, and a small hardly differentiated "canine" on each side of these; in the lower jaw there are three conical "incisors" on each side in front of the molars, the middle tooth on each side being largest. The dental formula consequently looks like this:

$$8+1+3+1+8$$
 $8+3+3+8$

For comparison I append that of the type of Japalura polygonata:

$$\frac{14+2+5+2+14}{14+3+3+14}$$

The small number of molars in both jaws is probably due to the youth of the specimen, as Siebenrock has shown that in some Agamidæ the number varies between 8 and 21, according to age,^a but the difference in the number of incisors is not so easily explained, for it seems, according to the same authority,^b as if the young animals have even more incisors than the adult, a condition reversed in the Japalura and the uncertain young Agamoid before us.

A young specimen of Japalura swinhonis (U.S.N.M. No. 34097), from Formosa, though more than once and a half as large as Hallowell's specimen, corroborates the above. In the upper jaw it has nine "molars," two "canines," and four "incisors," consequently essentially like the adult, only fewer molars.

Hallowell's description is as follows:

OTOCRYPTIS Weig.

Among the saurians in the Loo-Choo collection is a very small Acrodont Iguanian, no doubt a young animal, which appears to belong to a genus very near if not identical with the Otocryptus of Weigmann. The form of the head, however, is different from that of Otocryptus, as described by Dumeril & Bibron, and the number of molar teeth is less, viz.:—eight instead of twelve. The specimen, small as it is, is much mutilated, and otherwise injured, but the following characters can be distinctly made out.

Gen. char. Head rounded, and high posteriorly, the anterior slope more gradual than the posterior, the front and vertex being nearly on a line; snout covered with polygonal scales; supraorbitar ridges distinct; eyelids covered with carinated scales of nearly equal size; occiput covered with polygonal scales, partly smooth, partly carinate; temples covered with carinated scales; eyelids covered with small scales.

<sup>a Sitz. Ber. Akad. Wiss. Wien, Math.-Naturw. Cl., CIV, Pt. 1, p. 1116 (Nov., 1895.)
b Idem, p. 1121.</sup>

The incisor teeth on each side separate, a control canine and eight tricuspid, the first three the smallest, the last two the largest the same number in the lower jaw; ears concealed by the integument, body expered with scales arranged in transverse rows, five fingers without serratures, the fourth tager a little the longest, all armed with recurved nails, tail slender.

Dimensions Length of head 4 lines, of neck and body 64 lines; of tail (mutilated) 10 lines, length of anterior extremities 6 lines, of posterior

Habitat. Loo-Choo One specimen Caught Nov 1854, by McKnight.

In addition to Hallowell's description, I note that the scales on the sides of the neck and body appear to be very small, almost granular.

No lizard corresponding to the above description has been brought from the Riu Kius by later travelers, and the possibility is, therefore, that a most interesting novelty may yet be found in those islands.

Family SCINCID.E.

Lizards with sealy tongue and lower surface covered with rounded, imbricate scales.

Distributed over all the warmer and temperate regions of the globe. Many species have an enormous geographic range owing to the ease with which they may be accidentally transported.

Throughout the family there is a strong tendency toward the suppression of the limbs, and although in the higher forms they are well developed, there are numerous genera in which they become rudimentary or even disappear entirely. None of these occur in Japanese or neighboring territory, all the species here represented belonging to six genera, having the normal number of digits.

KEY TO THE GENERA OF SKINES OCCURRING IN JAPAN AND ADJACENT TERRITORY.

at Moyable lower cyclid, fronto-parietals and interparietals distinct

b4 Supranasals present

- c Palatine bones separated on the median line Eumeers p. 193 c Palatine bones in contact on the median line ... Mahaya p. 213
- b2 Supranasals absent

11

- c3 Front spartetals in contact, dersals smooth or weakly bicarmate, slaws net retractile.
- d' Lower eyelid with an undivided transparent disk. Lemborisma p 218

c² Fronto-parietals not in contact, dorsals tricarinate—claws retractib-

Lygosauras p 221

Genus EUMECES " Wiegmann

18.34 Enimeres Wifemann Herpet Mex. p. 36 type, Sceneris parlimentation | E. schneelere.

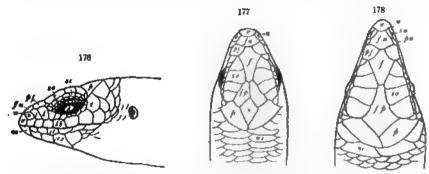
1839, Plestrodon Di Mercie and Branos, Erpét, Gen. V. p. 697, same types

" From ti whens clongated

1852. Lamprosaurus Hallowell, Proc. Phila. Acad., 41852 (p. 206) (type, L. guttulatus).

1871. Piistodon Cope, Sec. and Third Ann. Rep. Peabody Acad., 1871 (p. 82) (emendation).

The characters relied upon in the genus Eumeces for the proper separation and identification of the species are unfortunately subject to a wide range of variation, at least in some of the species. Such criterions as the absence or presence of a postnasal, of one or two postmentals, the number of scales around the body, etc., are apt to fail when most needed. Yet they are the only ones which the systematist has to rely on, and though he may be convinced that he has to deal with separate forms, nevertheless he may occasionally have to fall back on locality. Take, for instance, Eumeces elegans of Boulenger, from China. The only character by which I can distinguish it from E. latiscutatus, from Japan, is by the absence of a postnasal. Yet, among



Figs. 176-178.—Head shields of scinid lizards. 176, side view of head of Leiolopisma; 177. upper view of head of Leiolopisma; 178. upper view of head of Emola—cs. (hin-shields; d, disk on Lower Eyelid, c. far-opening, f frontal; fm, fronto-nasal, fp fronto-nasal; i. interparietal; il lower labials, f. loreals, fb, upper labials, m, mental, r nasal; mc, nuchals, p. parietals, pf. perfrontal, pr. postnasal, r, rosthal, sc, supper labials, m, supper

sixty-two Japanese specimens examined by me, five lack the postnasal on both sides and two on one side. It does not seem to be to the best interest of science to make E. elegans a synonym of E. latiscutatus. Much less would it do to call the five Japanese specimens E. elegans and enumerate both species as occurring together in the island of Hondo. Very likely some of these specimens without postnasals are brothers or sisters of the others which have this shield. Moreover, what are we to do with those which have it on one side but not on the other? It would probably be a fit case for trinominals were we to find a similar proportion of postnasals present in Chinese E. elegans, but unfortunately we have not sufficient material of the latter to determine the point. The most conservative proceeding therefore is to leave the two forms their binominal nomenclature at least until we shall know the Chinese form better.



FOR EXPLANATION OF PLATE SEE PAGE 554



The use of the following key in determining the skinks within the territory covered by this work must then be subject to the above remarks. The stability of the various characters employed may best be understood by a perusal of the remarks on variation following the descriptions of each species.

KEY TO THE JAPANESE SPECIES OF EUMECES.

- a¹ One unpaired postmental only (normally); upper temporal of the second row largest, wedge-shaped; soles of hind feet granular with only a few large tubercles on heel.
 - b^1 Posterior loreal nearly as high as long, normally in contact with two supralabials. c^1 Postnasal present (normally).
 - d^1 24 to 26 (except ionally 28) scales round the middle of the body.

E. latiscutatus, p. 195.

- d^2 28 to 32 scales round the middle of the body ... E. latiscutatus okadæ, p. 200.
- b^2 Posterior loreal much longer than high, in contact with three supralabials.

E. marginatus, p. 205.

- a² Two unpaired postmentals; lower temporal of the second row largest, wedge-shaped; soles of hind feet with two series of enlarged tubercles between heel and base of third and fourth toes.

 - b² Normally a postnasal and three pairs of nuchals......... E. kishinouyei, p. 210.

EUMECES LATISCUTATUS a (Hallowell).

TOKAGE.

Plate XV.

- 1838. Scincus quinquetineatus Schlegel, Fauna Japon., Rept., pp. 99, 139; Sauri et Batr., pl. 1, figs. 1-4b (Leiden Mus.; Siebold and Buerger, collectors) (not of Linnæus).—Plestiodon quinquelineatum Bleeker, Natuurk. Tijdschr. Nederland. Indië, XVI, 1858, p. 204 (Japan).—Eumeces quinquelineatus Hilgendorf, Sitz. Ber. Ges. Naturf. Fr. Berlin, 1880, p. 113.—Fritze, Mitth. Deutsch. Ges. Ost.-Asiens, V, 1891, p. 239 (Yezo).
- 1860. Plestiodon latiscutatus Hallowell, Proc. Phila. Acad., 1860, p. 496 (typelocality, Simoda, Japan; collected by the Rodger Exped.).
- 1864. Eumeces (Plestiodon) quinquelineatus var. japonicus Peters, Mon. Ber. Berlin Akad. Wiss., 1864, p. 57 (type-locality, Nagasaki; type in Berlin Mus.; von Martens, collector).—Martens, Preuss. Exped. Ost-Asien, Zool., I, 1876, p. 376 (Nagasaki).
- 1878. Eumeces (Plestiodon) japonicus Boettger, Offenbach. Ver. Naturk. 17-18 Ber., Mitth., p. 4 (Japan).
- 1879. Eumeces japonicus Bocourt, Miss. Sci. Mexique, Rept., livr. 6, p. 423.
- 1887. Eumeces marginatus Boulenger, Cat. Liz. Brit. Mus., III, p. 371 (part: Miyanoshta; Nikko) (not of Hallowell).—Okada, Cat. Vert. Japan, 1891, p. 70 (part: Tokyo; Ilakone; Nikko; Awaji; Suwa).—Boettger, Kat. Rept. Mus. Senckenberg., I, 1893, p. 111 (part: Nikko; Yezo).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 860; author's separate, p. 11 (part: Hondo; Yezo).

a Signifying with broad shields.

b Figs. 1, 3, 4, reproduced in this work on Plate XV.

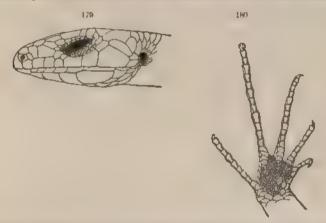
As the name *E. marginatus* belongs to the Riu Kiu species, *Eumeces latiscutatus* of Hallowell must be taken for that of Japan proper. The type appears to be lost, but there can be no doubt as to the pertinency of the name in spite of the fact that Hallowell apparently overlooked the presence of a postnasal. He describes his specimen as having "a plate above the anterior frenal," which, however, he considers an individual abnormality. The fact is that the plate alluded to is the real anterior frenal, or first loreal, while the scale he so designates is only the abnormally enlarged postnasal crowding the loreal out of contact with the supralabial. In specimens from the main islands of Japan this state of affairs is not uncommon (14 out of 47 specimens), and in extreme cases it looks at a first glance as if the postnasal were missing.

Doctor Hallowell does not state the locality in Japan where the type specimen of *E. latiscutatus* was collected, but the only entry in Dr. W. Stimpson's manuscript catalogue which can have reference to this specimen is his "Sm.—15. Lizard found on hillsides at Simoda, Japan, May, 1855. Black above, lineate with light blue. Below pale blue." Simoda may therefore be regarded as the type locality.

One may still occasionally see this species quoted as *E. quinquelineatus*, it being asserted upon Schlegel's authority that there is no difference between the Japanese and the North American species. A careful comparison will show that there exist material differences in the number of scale rows, size, and shape of rostral and nasals, size of median dorsal scales, shape of claws, etc., as already pointed out by Hallowell, Peters, and Boulenger. To their statements I may add that the two species can be very readily distinguished by the differences shown in the relative size and shape of the large temporal shields between the parietals and the seventh labial, the North American species having an arrangement very much like that of the Yaeyama species *E. kishinouyei* as distinguished from *E. marginatus*, *E. latiscutatus*, and their immediate allies and illustrated on figs. 179, 182, 184.

Description (figs. 179-180).—Adult male; U.S.N.M. No. 12715; Yokohama; April, 1881; P. L. Jouy, collector. Rostral high, bent over on the snout, the portion visible from above being nearly as large as the fronto-nasal; supranasals in contact behind rostral; nostril in the anterior portion of a single nasal, which is higher anteriorly than posteriorly; a small postnasal in contact with supranasal, nasal, first and second labials (on left side with first labial only) and anterior loreal; fronto-nasal broader than long, not in contact with rostral nor with frontal; prefrontals nearly as large as fronto-nasal in contact behind the fronto-nasal, also in contact with both loreals and with upper preocular and anterior supraocular; anterior loreal high and narrow, in contact with second supralabial (on left side also with first); posterior loreal pentagonal, nearly as high as wide, in contact with

second and third supralabials; frontal as long as parietals, longer than its distance from tip of snout, anteriorly a little wider than behind, in contact with three supraoculars; four supraoculars, second largest; seven superciliaries; fronto-parietals somewhat smaller than interparietal; parietals large, in contact behind interparietal; one pair of nuchals; seven supralabials, seventh largest, fifth under the eye; two temporals in the first row, lower much the larger, upper temporal in the second row very large, much larger than lower one, wedge-shaped with the apex pointing forward; lower temporal of the second row elongate squarish, with upper and lower edges nearly parallel; a single large scale between seventh supralabial and ear-opening which is bordered anteriorly by a few projecting granules; mental small, followed by a single pentagonal, unpaired postmental; seven lower labials, the sixth being band-like, long and narrow; body covered above and below with cycloid scales in 26 rows around the middle, those on the



Figs. 179-180 Edmeces latiscutatus $2 \times$ nat size. 179, side of head, normal lostnasat; (2) \times nat size) (8), underside of hind foot. No 6196, U.S.N.M.

middle of the back slightly wider than the others, laterals not essentially smaller than ventrals; a pair of large preanal plates; length of hind leg contained twice and a half times in the distance from shout to vent; the adpressed limbs overlap by the length of the fingers; sole of hind foot granular with a single larger tubercle and a few others at the heel; a specialized scale with a claw-like pointed keel behind the vent at each corner; tail cylindric, tapering, slightly swollen underneath at base, with a series of wide transverse plates on the underside. Color (in alcohol), above pale olive gray with a dorso-lateral whitish band about one scale wide, bordered below by a broad dark-brown band from the eye over the ear-opening, above the legs and continued on the tail nearly to the tip; head nearly uniform olive clay color; whole underside, including lower half of flanks, whitish, chin and throat suffused with clay color, the rest with bluish gray.

Dimensions.

•	<i>77.77</i>
Total length	180
Snout to vent	6
Vent to tip of tail	
Snout to ear-opening	
Greatest width of head	
Axilla to groin	
Fore leg	
Hind leg	

The female differs in lacking the swelling at the base of the tail and apparently also the differentiated keeled scale behind each corner of the vent.

The younger individuals differ in not having the temporal region swollen and also differ greatly in color. As exemplified by a large series from Mount Fuji, they are (in alcohol) nearly blackish brown above, becoming dark brownish slate on the terminal half of the tail, with five pale longitudinal stripes, viz, one median; one on each side proceeding from the outer edge of the supraoculars down the sides of the back, two scale widths from the median stripes; finally, a lateral stripe on each side originating on the supralabials, through the ear and above both fore and hind legs; all continued on the tail where they gradually disappear; the median stripe bifurcates on the interparietal, each branch following the outer edge of the frontal to the snout, which is pale brownish; underside bluish gray, except chin, throat, limbs underneath, anal plate, and the subcaudal transverse plates, which are pale buff. According to Stimpson they are black in life with light blue stripes and pale blue underside.

Variation.—There is considerable variability in the head scales and their various relations, but as it would be of little use to note all the deviations from the specimen described above, it will be sufficient to call attention to those which are of systematic value.

Out of 62 specimens examined by me only one (No. 34123) has the azygous postmental divided, and the abnormality of the specimen is further shown by a small portion of the side of the posterior postmental being also separated by a suture.

In 3 specimens (Nos. 34120, 34130, 34138) the posterior loreal is in contact with three supralabials on both sides; in one (No. 30734) on one side only, and in one (No. 34126) it barely touches the third labial on one side.

Five specimens (Nos. 34119, 34121, 34126, 34127, 34133) have no postnasal at all; two lack it on one side only (Nos. 34128, 34139), while in 37 specimens it is present on both sides.

Curiously enough the variation in the postnasal is most pronounced in a single series of specimens collected near Mount Fuji in September, 1898. Out of the 21 specimens five have no postnasals at all, two on one side only, and of the fourteen others which have it on both sides, no less than nine have the postnasal so large as to crowd the anterior loreal away from the supralabials, so that only in five does it come in contact with the supralabials behind the postnasal and that not even always on both sides.

Of 39 specimens, the only ones examined for this character, the scale rows around the middle of the body are 28 in two only, 26 in twenty-four, and 24 in thirteen.

Habitat.—Apparently confined to the large islands of Japan proper. The types came from the hills back of Simoda, and the species is apparently quite common in that part of Hondo. We have a large number from around Mount Fuji and from Yokohama; British Museum has it from Miyanoshta and Nikko, whence specimens are also in the Senckenberg Museum, and Okada records it from Tokyo From farther south the latter also indicates the provand Hakone inces of Awaji and Suwa: the Hamburg Museum has it from Kiyotaki toge in the province of Kawachi (No. 1833), and the United States National Museum from Korivama, province of Yamato. From northern Hondo there are no records. From Yezo, however, there is said to be a specimen in the Senckenberg Museum received from Mr. B. Schmacker, and Doctor Fritze also indicates it from that island, without giving his authority, however. If occurring there, it must be rare or local. Dr. Hugh M. Smith brought us a fine series from Kochi, on Shikoku, the only record from that island. He also collected it in the extreme southern end of Kiusiu at Yamagawa, province of Satsuma. Our museum also has it from Miyazaki, and von Martens obtained it at Nagasaki, from which locality the Riksmuseum in Stockholm also has a specimen (No. 2319), collected by Dr. Oscar Nordquist in October, 1879, during the Vega expedition

Last of specimens of Eumoces latiscutatus

I'S Sec NM and No age	Locality.	When rol lected	By whom ecllorise	24/01/07	Post- Post
Gliptin (a	Тарып			1	: 1
0106b	do .				2, 1
P160c	वै ।				1 1
B1067	1)				1 1
B166e	ło				1 1
12718 (6)	Yokohama .	Apr., 1881	Dale and Jour	29	1 1
13750 .	10.		P. L. Jeuy		1 1
30734	Miyazaki Kibabi.		C. A. Coark	24	1 1
31904	Koriyama, Yamata.	Apr. 26 1903	H M Smith	26	1 I
31632	Yamagawa, Kusu	Tune 14 4903	do	24	1 1
a1803 1.	10.	lo.	do	24	1 L
• Figs	1"W-1KO			⁶ Descriptio	n j= 146

σSee however, remarks on alleged Yeze specimens by the same collector, μφ 433, and 275.

List of specimens of Eumeees latiscutatus-Continued.

U.S. Sex And Locality. When collected. By whom collected. Roale Poet Roale Roale Poet Roale Roale Roale Poet Roale R					, ساد م	••		
31835	N.M	and	Locality.		By whom collected.		me.i-	
31836 do. do. do. do. 26 1 1	31834	ļ —	Yamagawa; Kiusiu	June 14, 1903	H. M. Smith	26	1	1
31837	31835	ļ	do,,	do	do	26	1	1
31879 Fochi, Shikoku May 11, 1903 do 25 1 1	31836	ļ	do	do	do	26	1	1
31880	31837	ļ	,do	do	do	26	1	1
31881	31879		Kochi, Shikoku	May 11,1903	do	26	1	1
11882	31880		do	do	do	26	1	1
31883 do	31881		do,	do	do	26	1	1
31800	31882		do	do	do	26	1	1
31891	31883		do	do,	do	26	1	1
31892	31890		,,do,	do	do	26	1	1
31893	31891		do	do	do	24	1	1
34119 Mount Fuji 8ept., 1888 A Owston. 24 1 0 34120 .do. .do. .do. .do. .26 1 1 34121 .do. .do. .do. .do. .do. .24 1 0 34122 .do. .do. .do. .do. .do. .26 2 1 34123 .do. .do. .do. .do. .do. .26 2 1 34124 .do. .do. .do. .do. .do. .24 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	31892		do	do	do	28	1	1
34120 .do .do .do .26 1 1 34121 .do .do .do .24 1 0 34122 .do .do .do .do .24 1 1 34123 .do .do .do .do .26 2 1 34124 .do .do .do .do .24 1 1 34125 .do .do .do .do .24 1 1 34126 .do .do .do .do .26 1 0 34127 .do .do .do .do .24 1 0 34128 .do .do .do .do .26 1 1 34129 .do .do .do .do .26 1 1 34130 .do .do .do .do .26 1 1 34131 .do <td>31893</td> <td></td> <td>do</td> <td>do</td> <td>do</td> <td>28</td> <td>1</td> <td>1</td>	31893		do	do	do	28	1	1
34121 do. do. do. 24 1 0 34122 do. do. do. do. 24 1 1 34123 do. do. do. do. 26 2 1 34124 do. do. do. do. 24 1 1 34125 do. do. do. do. 24 1 1 34126 do. do. do. do. 26 1 0 34127 do. do. do. do. 26 1 0 34128 do. do. do. do. 25 1 1 0 34129 do. do. do. do. 26 1 1 1 34130 do. 26 1 1 1 34131 do. 26 1 1 1 34132 do. do. 26 1 1 1 <td>34119</td> <td></td> <td>Mount Full</td> <td>Sept., 1898</td> <td>A Owston</td> <td>24</td> <td>1</td> <td>0</td>	34119		Mount Full	Sept., 1898	A Owston	24	1	0
34122 do. do. do. do. 24 1 1 24123 do. do. do. do. 26 2 1 34124 do. do. do. do. 24 1 1 34125 do. do. do. do. 24 1 1 34126 do. do. do. do. 26 1 0 34127 do. do. do. do. 24 1 0 34128 do. do. do. do. 25 1 1-0 34128 do. do. do. do. 25 1 1-0 34128 do. do. do. do. 25 1 1-0 34130 do. do. do. do. 26 1 1 34131 do. do. do. do. 26 1 1	34120	1	do	do	do	25	1	1
34123 do do do do 26 2 1 34124 do do do do 24 1 1 34125 do do do 24 1 1 34126 do do do 26 1 0 34127 do do do do 24 1 0 34128 do do do do 26 1 1 0 34129 do do do do 25 1 1 1 34130 do 26 1 1 34131 do 26 1 1 34132 do do do 26 1 1 34133 do 26 1 1 34133 do 26 1 1 34133 do 26 1 1 34134 do 26 1 1 34135 do	34121		do	do	do	24	1	0
34124 do .do .do 24 1 1 34125 .do .do .do .do .24 1 1 34126 .do .do .do .do .26 1 0 34127 .do .do .do .do .24 1 0 34128 .do .do .do .do .25 1 1-0 34129 .do .do .do .do .26 1 1 34130 .do .do .do .do .26 1 1 34131 .do .do .do .do .24 1 1 34132 .do .do .do .do .26 1 I 34133 .do .do .do .do .26 1 I 34134 .do .do .do .do .26 1 I 34135 <td>34122</td> <td></td> <td>do</td> <td>do</td> <td>do</td> <td>24</td> <td>1</td> <td>1</td>	34122		do	do	do	24	1	1
34125 do do do 24 1 1 34126 do do do do 26 1 0 34127 do do do do 24 1 0 34128 do do do do 28 1 1-0 34129 do do do 25 1 1 34130 do do do 26 1 1 34131 do do do 24 1 1 34132 do do do 26 1 1 34132 do do do 26 1 1 34133 do do do 26 1 1 34133 do do do 26 1 0 34134 do do do 26 1 1 34135 do <t< td=""><td>34123</td><td></td><td>do</td><td>do</td><td>do</td><td>26</td><td>2</td><td>1</td></t<>	34123		do	do	do	26	2	1
34126 .do. .do. .do. .do. .26 1 0 34127 .do. .do. .do. .do. .24 1 0 34128 .do. .do. .do. .do. .26 1 1-0 34129 .do. .do. .do. .do. .26 1 1 34130 .do. .do. .do. .do. .26 1 1 34131 .do. .do. .do. .do. .26 1 1 34132 .do. .do. .do. .do. .26 1 1 34133 .do. .do. .do. .do. .26 1 1 34133 .do. .do. .do. .do. .26 1 1 34134 .do. .do. .do. .do. .26 1 1 34135 .do. .do. .do. .do. .26 <td< td=""><td>34124</td><td></td><td>do,</td><td>do</td><td>do</td><td>24</td><td>1</td><td>1</td></td<>	34124		do,	do	do	24	1	1
34127 .do. .do. .do. .24 1 0 34128 .do. .do. .do. .do. .26 1 1-0 34129 .do. .do. .do. .do. .26 1 1 34130 .do. .do. .do. .do. .26 1 1 34131 .do. .do. .do. .do. .26 1 1 34132 .do. .do. .do. .do. .26 1 1 34133 .do. .do. .do. .do. .26 1 1 34134 .do. .do. .do. .do. .26 1 1 34135 .do. .do. .do. .do. .24 1 1 34136 .do. .do. .do. .do. .26 1 1 34137 .do. .do. .do. .do. .24 1 1<	34125		do	do	do	24	1	ı
34128 .do. .do. .do. .26 1 1-0 34129 .do. .do. .do. .do. .26 1 1 34130 .do. .do. .do. .do. .26 1 1 34131 .do. .do. .do. .do. .24 1 1 34132 .do. .do. .do. .do. .26 1 I 34133 .do. .do. .do. .do. .26 1 0 34134 .do. .do. .do. .do. .26 1 1 34135 .do. .do. .do. .do. .24 1 1 34136 .do. .do. .do. .do. .25 1 I 34137 .do. .do. .do. .do. .24 1 1 34138 .do. .do. .do. .do. .do. .do. <t< td=""><td>34126</td><td></td><td>do</td><td>do</td><td>do</td><td>26</td><td>1</td><td>0</td></t<>	34126		do	do	do	26	1	0
34129 .do. .do. .do. .26 1 1 34130 .do. .do. .do. .26 1 1 34131 .do. .do. .do. .24 1 1 34132 .do. .do. .do. .26 1 1 34133 .do. .do. .do. .26 1 0 34134 .do. .do. .do. .26 1 1 34135 .do. .do. .do. .24 1 1 34137 .do. .do. .do. .24 1 1 34138 .do. .do. .do. .24 1 1	34127		do,	do	do	24	1	0
34130 .do. .do. .do. .28 1 1 34131 .do. .do. .do. .24 1 1 34132 .do. .do. .do. .do. .25 1 1 34133 .do. .do. .do. .do. .26 1 0 34134 .do. .do. .do. .do. .26 1 1 34135 .do. .do. .do. .do. .24 1 1 34137 .do. .do. .do. .do. .24 1 1 34138 .do. .do. .do. .do. .24 1 1	34128	1	do,	do,	do	26	1	1-0
34131 .do. .do. .do. .do. .24 1 1 34132 .do. .do. .do. .do. .26 1 1 34133 .do. .do. .do. .do. .26 1 0 34134 .do. .do. .do. .do. .26 1 1 34135 .do. .do. .do. .do. .26 1 1 34137 .do. .do. .do. .do. .24 1 1 34138 .do. .do. .do. .do. .24 1 1	34129		do,	. do	do	26	1	1
34132 do, do, do, do. 26 1 1 34133 do, do, do, do, 26 1 0 34134 do, do, do, 26 1 1 34135 do, do, do, 24 1 1 34136 do, do, do, 26 1 1 34137 do, do, do, 24 1 1 34138 do, do, do, do, 24 1 1	34130		do	do	do	26	1	1
34133 de. de.<	34131		do	' do	do	24	1	ι
34134 .do. do. .do. .26 1 34135 .do. .do. .do. .24 1 34136 .do. .do. .do. .26 1 34137 .do. .do. .do. .24 1 34138 .do. .do. .do. .24 1	34132		do,	do	do	26	1	1
34135 do. do. .do. .do. .24 t 1 34136 do. do. .do. .26 t 1 34137 do. do. .do. .24 t 1 34138 do. .do. .24 t 1	34133		do	. do	do	26	3	0
34136 <	34134		do.,	1 do	do	26	1	1
34136 <	34135		do	do	do	24	1	1
34138 do	34136		do, , ,	. do., .,		26	L	ı
	34137		do.,	do	do	24	t	1
34130 do., do , do., 26 1 1-0	34138		do	do	. do	24	t	ı
	34139			do .	do	2h	1	1-0

EUMECES LATISCUTATUS OKADÆ, a new subspecies.

Diagnosis.—Scales round the body 28-30; first upper labial forming a suture with the nasal and the postnasal; a single postmental.

Habitat. Miyakeshima, Idzu Seven Islands, Japan (not to be confounded with Miyakoshima, Yaevama Islands).

Type.—U.S.N M. No. 23891; Miyakeshima; May 3; N. Okada, collector; topotypes in Science College Museum, Tokyo.

Description of type-specimen.—Rostral heptagonal, rather high, and broad at top, though not bent much over on the upper surface; nasal small with the nostril pierced in front of the center; a small postnasal in contact with first and second supralabial (fig. 181);

⁶ Named for Mr. S. Okada, the author of the Catalogue of Vertebrated Animals of Japan (Tokyo, 1891).

supranasals broadly in contact, larger than prefrontals; frontonasal longer than wide, behind broadly in contact with frontal; anterior loreal forming a suture with frontonasal; four supraoculars, the three anterior in contact with frontal; six supercibaries; one pair of nuchals in contact with posterior border of parietals and interparietal, seven supralabials, fifth bordering the orbit, seventh largest; one unpaired postmental; ear-opening slightly larger than largest dorsal scales and bordered anteriorly by about 5 distinct obtuse tubercles; 30 scale rows round the middle of the body, the laterals very much

smaller than either ventrals or dorsals, the two median rows of the latter slightly larger than the others; two very large preanal scales; length of hind limb (from groin to tip of fourth toe) contained twice in the distance from shout to vent; limbs overlap considerably when pressed against the body; no continuous row of tubercles on soles from heel to base of fourth toe; median series of subcaudals transversely enlarged anteriorly. Color (in alcohol) above uniform dark



FIG. 181 ELMECES LATI-SCHATUS OKADE. 2 X NAT. SIZE. SIDE OF FACE. No. 23895, U.S.N.M.

olive; an obscure brownish band proceeds from eye backward above the limbs disappearing at the base of tail; this band is bordered above by an equally obscure pale band, these bands so obscure as to be imperceptible in the specimen when taken out of the alcohol; underside bluish, chin and throat whitish.

Inmensions.	mm.
Total length	130
Snout to vent	. 56
Snout to ear-opening	13
Greatest width of head	9
Axilla to groin	29
Fore limb	. 20
Hind limb	. 28

Remarks.—The present species is most nearly related to E. latiscutatus from the main island opposite, and is probably a direct off-spring of the latter. It differs chiefly in the greater number of scale rows round the middle of the body and apparently also in a somewhat different coloration, inasmuch as even young specimens of the island form are of a more or less uniform olive color without the strongly marked pale lines so characteristic of the main island specimens of corresponding size. They are only plainly marked in the smallest specimen from Niishima, measuring 40 mm, from shout to vent, and even in this specimen the median line does not reach the head.

The additional number of scale rows makes the diagnosis of the new species read even more like that of E. fasciatus of the United

States of North America than *E. latiscutatus*, but aside from the single unpaired postmental common to both the Japanese species, the shape of the rostral as well as the position of the nostril in the nasal in the latter are characters in themselves sufficient to distinguish them from their North American relative, not to speak of the difference in the temporal scales as mentioned above.

The segregation of the present form from that of the main island is no more remarkable than that of the very distinct thrush, *Turdus celænops*, of the same island, from *T. chrysolaus* of the mainland, as well as *Acanthopneuste ijimæ* from *A. coronata*, and *Parus owstoni* from *P. varius*.

Doctor Ijima informs me that he has five more specimens of the same form "all of the same or similar coloration."

Habitat.—This form probably occurs on all the islands of the Seven Islands Archipelago of Idzu, but I have only seen specimens from Miyakeshima and Niishima.

Museum. No.		Sex and age	Locality.		n col-	By whom collected.	Scale rows.	Postmentais.	Postnasal.
U.S.N.M	23891	(n)	Miyakeshima, Idzu	May	3,1897	Okada	30	1	1
Do	23892		do	d	lo	do	30	1	1
Do	23895	(6)	Niishima, Idzu			¹do	28		1
Do	23896		do			do	28		1
Do	36533	!	.do			. do	30		1
Do	36531		do	1		,do,,, ,,	28		1
Do	36532		40			.do	28		1
Do	36534	(0)	Miyakeshima, Idzu	May	3,1887	. do., .	-30		1
Sci. Coll. Tokyo			do	1		Hirota	28	ī	1
Type, des	eriptios	- ъ р. 2	00.	! o. 46, fi	g. 181	c Sel. Coll	No.	17.	

List of specimens of Eumeces okadae.

EUMECES ELEGANSa Boulenger,

1863. Mabouta chinenus Swinhoe, Ann. Mag. Nat. Hist. (3), XII. p. 225 (Tamsui, Formosa) (not of Gray 1838). Giventher, Rept., Brit. India, 1864, p. 83 (part), pl. x, fig. F (Ningpo). Boetrger. Offenbach, Ver. Naturk, 24-25 Ber., 1885, p. 144.

1879. Euroces pulchea Bocourt, Miss. Sci. Mexique, Zool., Rept., hvr. 6, p. 423-(not of Duméril and Ribron).

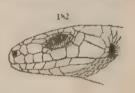
1887. Enmeces elegans Bot Lenger, Cat. Liz. Brit. Mus., 111 p. 371 (type-locality, Ningpo China, type in Brit. Mus., Formosa, Shanghai, Kiukiang, Pescadores —Boffwer, Ber. Senckenberg, Naturf, Ges., 1894, p. 146, Chapu, near Ningpo) —Steineger, Journ, Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 220 (Tatpa, Formosa, Pescadores).—Lygosoma elegans Guenther, Ann. Mag. Nat. Hist. (6), I. 1888, p. 169 (Mts. north of Kiukiang, China)

Signifying elegant.

A direct comparison of typical Eumeces eligans from China (which our museum owes to the kindness of Dr. O. Boettger) with E. latiscutatus, from Japan, and E. marginatus, from the Riukius, shows that it is more nearly related to the former than to the latter, the second loreal being as high and short as in the most typical E. latiscutatus. In fact, the only difference I can see consists in the presence of a postnasal in the latter, in this respect agreeing with E. marginatus. The latter I regard as less closely related to the other two than these are among themselves. For further remarks on this subject see above (p. 194).

Description (figs. 182-183).—Mele; U.S.N.M. No. 36507 (Science College Museum, Tokyo, No. 20a); Taipa, northern Formosa,

October, 1896: T. Tada, collector. Rostral high, rather narrow, the portion visible from above slightly smaller than fronto-nasal; supranasals broadly in contact behind rostral; nostril in the anterior portion of a single nasal which is much higher in front than behind; no postnasal; fronto-nasal much broader than long, not in contact with rostral, but with frontal; prefrontals smaller than fronto-nasal, not in contact with each other, but with both loreals, upper preocular and anterior supraocular; anterior loreal higher than the posterior, in contact with supranasal, nasal, first and second supralabials; posterior loreal pentagonal, as high as wide, in contact with second and third supralabials (on left side also barely touching fourth); frontal longer than parietals, longer than its distance from tip of snout, anteriorly a little wider than behind, in contact with three





Figs. 182-183 - Et medes elsgans. 2xnat.siz), 182,side of head, 183, oath. No 208, Sci tol., Tokyo.

supraoculars; four supraoculars, second largest; six or seven superciliaries; fronto-parietals smaller than interparietal, which is as long as the parietals and broadly in contact behind with the nuchals; parietals not in contact behind the interparietal; one pair of nuchals; seven supralabials, seventh largest, fifth under the eye; two temporals in first row, lower many times larger than the upper; upper temporal in the second row very large, much larger than the lower one, wedge-shaped, or conical, with the apex forward; lower temporal of the second row long and narrow with nearly parallel upper and lower edges; a single scale row between seventh supralabial and ear-opening, which is bordered anteriorly by several projecting lobules; mental followed by a single pentagonal, unpaired postmental; seven lower labials, sixth longest; 28 scale rows around the middle

of the body, those on the sides apparently smaller than those on back and abdomen; a pair of large preanal plates; length of hind leg contained nearly two and a half times in the distance from snout to vent; the adpressed limbs overlap by the length of the fingers; soles of hind foot granular with a single larger tubercle and several others at the heel; a small keeled scale behind the vent at each corner; tail cylindric, tapering, with a series of wide transverse plates underneath. Color (in alcohol) above dark olive brown on the middle of the back, dark brown on the sides, becoming slaty toward the terminal half of the tail, with five pale greenish, longitudinal stripes, viz., one median, somewhat broader than the others; one on each side proceeding from the outer edge of the supraoculars down the sides of the back two scale widths from the median stripe; finally, a lateral stripe on each side originating on the upper lip proceeding backward through the ear-opening and above both fore and hind legs, all continued on the tail, where they gradually disappear; the median stripe bifurcates on the interparietal, each branch following the outer edge of the frontal to the snout which is pale buff; underside pale, suffused with buff on throat, lower neck, limbs, and tail, but with pale bluish on abdomen and flanks.

Dimensions.

	mm.
Total length	179
Snout to vent	68
Vent to tip of tail	111
Snout to ear-opening	
Greatest width of head	
Axilla to groin	35
Fore leg	19
Hind leg.	28

Variation.—In younger specimens the ground color is darker, brownish black, and the median dorsal stripe narrower; otherwise as the specimen described above. In older specimens the back becomes more olive and the median stripe disappears altogether, the head swells greatly in the temporal region and becomes red. A male from the Pescadores Islands, collected by Mr. Tada in January, 1897, has this coloration of the fully adult specimens, the brown longitudinal band on the flanks even being quite pale, notwithstanding the fact that it is of the same size (snout to vent, 68 mm.) as the adolescent specimen described above.

The scutellation of the head in these specimens is fairly constant. Thus all four have the parietals widely separated by the interparietal. In three the frontal is in contact with the fronto-nasal, but in the fourth, the largest specimen, the prefrontals are in contact behind the fronto-nasal, thus separating it from the frontal. The number of scale rows seems to be very variable, as two have 26, one 24, and one 28.

Habitat.—Swinhoe collected two half-grown specimens in Formosa, which are in the British Museum. The Science College, Tokyo, has several striped specimens from Taipa, Formosa (No. 20), collected in October, 1896, and one nearly uniform specimen (No. 19) from the Pescadores Islands, January, 1897.

The species is known from the mainland of China between Shanghai and the province of Fokien as far inland as Kiukiang, on the Yangtse River.

Museum.	No.	Sex and age.	Locality.	When collected.	By whom col lected	Seale rows,	Poetmentals.	Postnassi.
U.S.N M	36507	(4)	Taipa, Formosa	Oct., 1896	T. Tada	28	ı	Ð
Sci Coll. Tokyo	20	(6)	do	do	do	24		Ð
Do	20	} ,*****	d o	do	do	26		-0
Do	19	(*)	Pescadores Islanda	Jan., 1897	do	26	1.	- 0
		l i	_	٠	1		!	
¢ De	ecriptic	on, p. 2	204. è Fig	s. 182-183.	¢ P. 205.			

List of specimens of Eumeces elegans.

EUMECES MARGINATUS a (Hallowell).

1860. Plestiodon marginatus Hallowell, Proc. Phila. Acad., 1860, p. 492 (typelocality, "Loo Choo Island;" type, U.S.N.M. No. 11713; W. Stimpson, collector).—Eumeces marginatus Boulenger, Cat. Liz. Brit. Mus., III, 1887, p. 371 (part: Nara); Ann. Mag. Nat. Hist. (6), X. Oct. 1892, p. 302 (Okinawa; Holst, collector).—Boettger, Ber Senckenberg, Naturf. Ges., 1888, Abh. p. 188 (O-shima, Riu Kiu). Okada, Cat. Vert. Japan. 1891, p. 70 (part: Okinawa).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 860; author's separate, p. 11 (part: Okinawa).—Brown, Proc. Phila. Acad., 1902, June 11, p. 185 ("Loo Choo Islands," probably Okinawa shima).

The larger of Hallowell's two types, said to have been collected on "Ousima" (i. e., Amami-o-shima), appears to have been lost, and as it would be utterly impossible from his description now to decide one way or the other, all we can do is to accept the other specimen, viz, the one which Dr. W. Stimpson collected in "Loo Choo Island" April, 1855, and which is now before me, United States National Museum No. 11713, as the type upon which to base the name.

This specimen agrees with numerous specimens from Okinawa shima in every respect and a comparison with over sixty specimens from Japan proper proves them to be unquestionably distinct. Not only do the Okinawa specimens lack the postnasal, a character which is usually conceded to be of sufficient importance, but there are material differences in other points, notably in the size and shape of the large second loreal. This shield in the Riu Kiu specimens is much lower and longer with less difference in the length of the ante-

a Having a margin or edge; application obscure, but probably the word is here used loosely as meaning striped.

rior and the posterior borders, and is in contact with three supralabials, viz, the second, third, and fourth. In all specimens from Japan proper I have found the second loreal much shorter and higher, with the anterior border much higher than the posterior one, and except in a few cases mentioned above, only in contact with two supralabials, viz, the second and third (if there are seven supralabials in all, but with the third and fourth in exceptional cases of eight supralabials).

Description.—Adult male; U. S. N. M. No. 11713; "Loo Choo Island" = Okinawa shima; April, 1855; W. Stimpson, collector; type

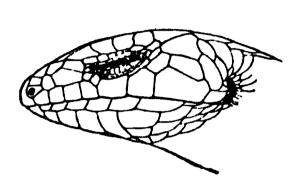


FIG. 184.—EUMECES MARGINATUS.

2 X NAT. SIZE. SIDE OF HEAD.

NO. 11713, U.S.N.M.

(fig. 184).—Rostral pentagonal, the portion visible from above much smaller than frontonasal; supranasals in contact behind rostral; nostril in the anterior portion of a single nasal which is somewhat higher in front than behind; no postnasal; fronto-nasal somewhat broader than long, not in contact with rostral, but broadly so with frontal; prefrontals much smaller than fronto-nasal, in contact with both loreals, upper preocular and ante-

rior supraocular, but not with each other; anterior loreal high and narrow, in contact with nasal, first and second supralabials; posterior loreal pentagonal, much wider than high, in contact with second, third, and fourth supralabials; frontal longer than parietals and much longer than its distance from tip of snout, anteriorly wider than behind, in contact with three supraoculars; four supraoculars, none unusually developed; fronto-parietals scarcely more than half as large as interparietal; interparietal as long as parietals, broadly in contact behind with nuchals; parietals rather small, not in contact; one pair of nuchals; seven supralabials, seventh largest, fifth under the eye; two temporals in first row, lower one several times larger than upper one; two temporals in second row, the upper one largest, wedge-shaped with the apex forward, the lower narrower with nearly parallel upper and lower edges; a single large scale between seventh supralabial and earopening which is bordered anteriorly by several projecting lobules; mental followed by a single narrow, pentangular, unpaired postmental; seven lower labials, sixth very long and narrow; 26 scales around the middle of the body, the lateral but very slightly smaller than the others; a pair of large preanal plates; length of hind leg contained two and a half times in the distance from snout to vent; the adpressed limbs overlap by the length of the longest toe; sole of hind foot with small scales or granules, but no enlarged tubercles except a few at heel; a strongly keeled scale behind the vent at each corner; tail cylindric, swollen at base underneath, with a series of wide

transverse plates on the underside. Color (in alcohol) above pale olive gray with faint indications of a median and two dorso-lateral pale stripes as well as of a darker brownish band on upper half of flanks; head yellowish buff (probably red in life); underside pale buffy white, abdomen and flanks grayish.

Dimensions.

	mm.
Total length	138
Snout to vent	65
Vent to tip of tail	74
- Snout to ear-opening	14
Greatest width of head	
Axilla to groin	35
Fore leg.	19
Hind leg	26

The female and younger stages are exactly like the corresponding ones in Eumeces latiscutatus and E. elegans.

Variation.—In the series of nine specimens before me the variation is very slight. All lack the postnasal; all have one postmental only, supranasals in contact behind rostral; fronto-nasal in contact with rostral, parietals separated by interparietal, and in all the second loreal is in contact with three supralabials. All have 26 scale rows, except No. 34185 which has 28.

No. 23894 presents a very unusual abnormality in the scutellation of the upper parts of the head, in as much as the fronto-parietals have been fused in such a way with the surrounding scutes that the frontal has come into contact with the fourth supraocular, parietals, and interparietal, the latter shield separating the parietals in their entire length.

Habitat.—This skink as far as known is confined to the Riu Kiu islands, and if our surmise as to Hallowell's second specimen is correct, it occurs in all three groups of the archipelago.^a In Okinawa it appears from all accounts to be common, and in the Yaeyama group it has been collected both by Doctor Warburg and by Doctor Lenz on Iriomote Island (Hamburg Mus. Nos. 1182 and 1900). Moreover, the United States National Museum has a specimen from Ishigaki shima (No. 34185).

a Boettger also refers to Eumces marginatus from O-shima, but as he did not distinguish between E. marginatus and E. latiscutatus no conclusion can be drawn from that record without a reexamination of the specimen.

List of specimens of	οſ	Eumeces	marginatus.
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Museum.	No.	Age.	Locality.	When ool-	By whom collected or from whom received.	Beale rows.	Postmental.	Postnassl.
						mm,	45.199	375.700
U.S.N.M.,	11713	Adult	Okinawa shima	Apr,1855	W Stimpson	26	1	0
Do	23803	do	do			26	1	0
Do	23594	Adolese, b	do	1887	Tashiro	26	1	0
Do	34185	Adult	Ishigaki shima	May, 1890	A. Owston	28	1	0
Do	36522	Adolesc.,	Okinawa shima	1887	Tambiro	26	1	0
Do	36523	do	do	do	do,	26	1	0
Do	36524	Young	do	!do .	do		1	0
Do	36525	do	do	.dn	.do		1	0
Sci. Coll. Tokyo.	3	Adolesc	Shuri, Okimiwa	July , 1895	bhiraishl.	26	1	0

a Type; description, p. 206, fig. 184.

b P. 207.

EUMECES CHINENSIS a (Gray).

1838. Tiliqua chinensis Gray, Ann. Nat. Hist., II, Dec., 1838, p. 289 (type-locality, China).—Mabouia chinensis Swinhoe, Ann. Mag. Nat. Hist. (3), XII, 1863, p. 225 (Tamsui, Formosa).—Eumeceschinensis Boulenger, Cat. Liz. Brit. Mus., III, 1887, p. 375 (Ningpo; Chusan; Si Kiang; Canton; Hongkong).—Boettger, Bez. Senckenberg. Naturi. Ges., 1894, pp. 132 (Hainan), 143 (Shanghai), 146 (Dalaushau and Chinhai, near Ningpo).—Steineger, Journ. Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 220 (Taipa, Formosa).

1839. Plestiodon sinense Dumérili and Bibron, Erpét. Gén., V, p. 704 (Canton; Paris Mus., Gernaert, collector).

1839. Plestodon pulchrum Dumériu and Bibron, Erpét. Gén., V, p. 710 (China).
1842. Tiliqua rufo-quitata Canton, Ann. Mag. Nat. Hist., 1X, 1842, p. 482 (type-locality, Chusan, type in Brit. Mus.; Cantor, collector).

Description.—Halfgrown; Science College Museum, Tokyo, No. 21; Taipa, Formosa; October, 1896; T. Tada, collector (fig. 185). Por-



Fig. 185. Eymeges chinensis, 2 × nat size; Sine of head. No. 21. Sci. Coll. Tokyo.

tion of nostril visible from above considerably smaller than fronto-nasal; supranasals broadly in contact behind rostral; nostril in the center of a single nasal which is nearly triangular; no postnasal; first supralabial in contact with supranasal behind nasal; fronto-nasal somewhat broader than long, not in contact with rostral but with

frontal; prefrontals smaller than fronto-nasal, in contact with anterior supraocular, upper preocular, and anterior loreal, but not with each other; anterior loreal nearly twice as high as wide, squarish, in contact with first and second supralabials (on left side also with third), supranasal, fronto-nasal, prefrontal, and upper preocular, but not with nasal; posterior loreal low, small, not larger than

anterior, nearly twice as wide as high, in contact with second, third, and fourth supralabials (on left side only with second and third), anterior loreal, and upper preocular, but not with prefrontal; upper preocular greatly clongated, extending along the entire upper edge of the posterior loreal so as to enter into broad contact with the anterior loreal; frontal much longer than parietals, longer than its distance from tip of snout, anteriorly somewhat wider than behind, in contact with three supraoculars, the sutures with first and third being very small; four supraoculars, first smallest, third very narrow, second unusually large; fronto-parietals larger than interparietal, slightly larger than prefrontals; interparietal pointed, behind separating the parietals which are comparatively short, much shorter than frontal; 2 pairs of nuchals; seven supralabials, fifth under the eye, seventh longest, but very low behind; two temporals in first row, lower much the larger; two temporals in second row, the upper rather narrow and elongated with parallel edges, the lower much larger, wedge-shaped with the apex forward; two scales between seventh supralabial and ear-opening, which is bordered anteriorly by three small lobules; mental small, followed by two unpaired postmentals, the anterior narrow, with parallel edges, the posterior larger, pentagonal; 7 lower labials; 24 smooth scales around the middle of the body, laterals not appreciably smaller; a pair of large preanal plates; length of hind leg contained two and two-thirds times in distance from snout to vent; the adpressed limbs overlap by about the length of the fingers; sole of hind foot granular, with two series of enlarged tubercles from heel to base of third and fourth toes; tail with a median series of transverse plates underneath. Color (in alcohol) above pale clay-color, with a network of brownish black color, each scale being merked with the dark and the light color in such a way as to bring out a median dorsal and on each side a dorso-lateral pale black-edged stripe; flanks and sides of neck similarly colored, but with about three irregular series of whitish spots instead of stripes; head above pale clay color, with traces of the pale dorsolateral stripe from supraoculars backwards, each shield outlined posteriorly or superiorly with blackish brown; underside umform whitish.

Dimensioned

	794.7	26
Shout to vent	72	
Should rear opening .	14)
Greatest width of head	- 10	'n
Axilla to groin	-38	
Fore leg	18	5
Hind kg	27	

2 Tail missing

Variation.—The specimen described above is probably abnormal in the exclusion of the anterior loreal from the nasal. In the descriptions of Chinese specimens 26 scale rows are sometimes indicated. In adult specimens the adpressed limbs are described as not overlapping.

The young are described as "dark brown above, with three longitudinal light bands on the back, the median broadest and not bifurcating anteriorly."

Habitat.—Eastern China from the island of Hainan northwards to Shanghai. It has also been recorded from Formosa. Swinhoe found it at Tamsui, and an apparently somewhat abnormal specimen collected by Mr. Tada at Taipa has been described and commented upon above.

List of specimens of Eumeces chinensis.

Museum.	 No. 	Age.	· 1	Locality.	When collected.	By whom collected.	Scale rows.	Postmental.	Postnasal.
Sci. Coll. Tokyo	21	- Adolesc.	- ₋ Taipa	Formosa	- Oct,1896	T. Tada	. 24	2	0

a Description, p. 208; fig. 185.

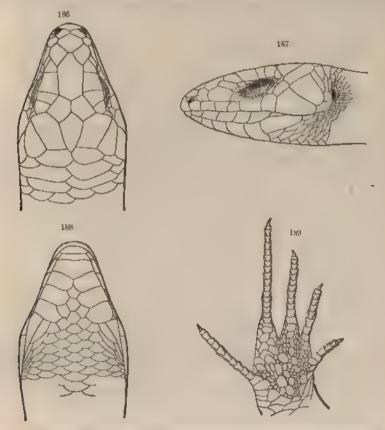
EUMECES KISHINOUYEIa Stejneger.

1901. Eumeces kishinouyci Stejneger, Proc. Biol. Soc. Washington, XIV, Dec. 12, 1901, p. 190 (type-locality, Miyakoshima, Sakishima group, Riu Kiu; type Sci. Coll. Mus. Tokyo, no. 22).

Description.—Adult: Science College Museum, Tokyo, No. 22; Miyakoshima, Riu Kiu Archipelago; Tashiro, collector, type (figs. 186-189.)-Rostral small, nearly triangular, the portion visible from above much smaller than fronto-nasal; supranasals in contact behind rostral; nostril in the center of a single nasal; a narrow, pentangular postnasal, in contact with supranasal, first and second supralabials: fronto-nasal broader than long, not in contact with rostral, but with frontal; prefrontals somewhat smaller than fronto-nasal, in contact with both loreals, upper preocular and anterior supraocular, but not with each other; anterior loreal about half the size of the posterior, in contact with second supralabial, supranasal, fronto-nasal, and prefrontal; posterior loreal nearly as high as anterior, and twice as large, in contact with second and third supralabials, anterior loreal, prefrontal, and upper preocular; upper preocular smaller than anterior supraocular, widely separated from anterior loreal; frontal much longer than parietals and its distance from tip of snout, with parallel lateral edges being of equal width in front and behind, in contact

aNamed in honor of Dr. K. Kishinouye, chief of the Fisheries Bureau, Imperial Department of Agriculture and Commerce, Tokyo.

with anterior three supraoculars, the suture with third supraocular very small; four supraoculars, second largest; fronto-parietals somewhat smaller than interparietal, about the same size as prefrontals; interparietal obtusely pointed behind, separating the parietals, which are comparatively small, much shorter than frontal; three pairs of nuchals, seven supralabials, fifth under the eye, seventh very large, but low behind; two temporals in first row, lower many times larger than upper; two temporals in second row, the upper rather narrow,



Figs. 189-189. Eumeges Rishinguyel 11 X nat. size. 186 for of Head, 187 side of Head, 188 underside of Head 2 X nat. size, 189 underside of Foot. No. 22, Sci. t old. Toryo

with slightly diverging upper and lower edges, the lower much larger, wedge-shaped, with the apex forward; a single, rather long scale between seventh supralabial and ear-opening, which is bordered anteriorly by three small lobules, mental small, followed by two unpaired postmentals, the anterior very narrow, band-like, the posterior pentagonal; 24 scales round the middle of the body, nearly subeque cach dorsal scale with about four distinct striæ; a pair of la preanal plates; length of hind leg contained about two sade.

thirds times in distance from snout to vent; the adpressed limbs overlap by about half the length of the fingers; sole of hind foot with two somewhat irregular series of enlarged tubercles from heel to base of third and fourth toes; tail with a series of transversely enlarged plates underneath. Color (in alcohol) above nearly uniform olive, head more clay color (in life probably red), underneath whitish.

Dimensions.

Total length (tip of tail reproduced)	mm. 259
Snout to vent	
Snout to tip of tail (tip reproduced)	111
Vent to ear-opening	31. 5
Greatest width of head	24
Axilla to groin	71
Fore leg	38
Hind leg	55

The type described above is in very poor state of preservation and is probably a female. A fully adult male in excellent condition (U.S.N.M. No. 34080) from Ishigaki shima agrees in all essential details with the type, except that the head is considerably more swollen at the temples. This specimen measures: Total length, 357 mm.; snout to vent, 159 mm.; vent to tip of tail, 198 mm.; snout to ear, 39 mm.; greatest width of head, 34 mm.

I find in none of these specimens any specially differentiated, keeled scale behind the vent near each corner as in *Eumeces latiscutatus* and its allies.

The half-grown specimens have a median dorsal pale band bordered with dark-brown lines, a dorso-lateral whitish stripe on each side similarly bordered above, and with a broad brown lateral band, below which again a whitish line.

A young specimen (Science College Museum, Tokyo, No. 35), from Iriomote shima, measuring 60 mm. from tip of snout to vent, differs in having the frontal shield somewhat broader in front than behind. The strike on the dorsals show almost as plainly as in the adult. It has three pairs of nuchals, but is abnormal in lacking a postnasal. The coloration is indicated below.

Variation. -I have six very large adult and adolescent specimens before me, two from Ishigaki shima, two from Iriomote shima, and two from Miyakoshima. In scutellation they are practically identical, and the postnasal is present and well developed in all. Its presence may therefore be regarded as normal in this species. Five of them in addition have three nuchals, three specimens have them on both sides, two on one side, while the sixth has two only on both sides (No. 34081); there is consequently reason to believe that three pairs is the normal number. In addition to these full-grown and nearly full-grown specimens, there is a seventh, quite young, black with yellowish stripes. It

agrees in every structural character with them, except in possessing no postnasal, thus closely approaching *E. chinensis*. As it comes from Irromote shima I have but little doubt that it is an abnormal specimen of *E. kishinouyei*, especially as it has the dorsal scales strated and three pairs of nuchals, while *E. chinensis* normally has but two. Moreover, it seems to differ somewhat in coloration from true *E. chinensis*, at least as it is described by Boulenger. He states that the young is "dark brown above, with three longitudinal light bands on the back, the median broadest and not bifurcating anteriorly; sides with light spots," while in the Yaeyama specimen the spots on the sides have united to form two additional longitudinal bands on each side, thus making seven in all, the median not broader than the others and distinctly bifurcating.

Remarks. This form, which assumes gigantic proportions, our specimen (No. 34080) measuring 159 mm. from shout to vent, is very closely alhed to Eumeces chinensis, from which it differs chiefly in the presence of a postnasal, three pairs of nuchals, and possibly in the coloration of the young.

Habitat. -Apparently confined to the southern group of the Riu Kiu chain of islands. I have examined specimens from all the principal islands, namely Miyakoshima, Ishigaki shima, and Iriomote or Nishiomote shima.

List of specimens of Euroces kishinouger.

Museum	No. Age		Locality.	By whom collected or from whom ge- ceased	scale rows	Seale ross		Nut haly,	
U.8 N M .	51(INE)	Addito	Ishigaki shima	June 1899	A Obeston	24	2	-1	3-3
			Ra kai						
Do	34080	do	do	do	30	26	- 2	1	2.2
Ser Cott Tokyo	22	do.b	Miyakoshima,		Pash ro	24	2	1	3.3
Da	22	Halfgr	do		le .	26	2	1	3-2
Do	23	do	Tric mote abjuta				2	1	3-3
1to	21	do	do			2.1	2	1	3.2
Do	35	Younge	do		Tashiro	26	2	- 0	3-3
Hamburg	100 k		Mayakoshiran		Dr. Warburg	24	- 2	- 1	

a P. 212.

Genus MABUYA b Fitzinger.

1826 Spondylneus Ferzingen, Neue Class Rept., p. 23 type Scincus sloanci Daudin)

1826. Mabnya Firzingen. Neue Class Rept p. 23 (type, M caronata Fitzinger).
1830 Euprepus Wagler Nat Syst Amph p. 161 (type, Secural multiposculus Kuhl)

^{*} Type description | 210 fgs. 180-180

[&]quot;Cat Liz Brit, Mus., III, p. 375

b A Cambbean name attributed to several lizards

- 1834. Euprepes Wiegmann, Herpet. Mex., p. 36 (emendation).
- 1815. Mabouya Gray, Cat. Liz. Brit. Mus., p. 93 (emendation).
- 1862. Mabuia Cope, Proc. Phila. Acad., 1862, p. 185 (emendation).

With reference to the names cited in the above synonymy it is true that Spondylurus occurs before Mabuya, but of two names having the same date that one selected by the reviser is to be retained. Mabuya has been so selected, not only by the first reviser, but by all subsequent authors. This rule is a direct application of article 28 of the International Rules of Zoological Nomenclature.

MABUYA LONGICAUDATA a (Hallowell).

Plate XVI.

- 1856. Euprepis longicaudata Hallowell, Trans. Amer. Philos. Soc. (2), XI, p. 77, pl. IV, fig. 1 [Euprepes on plate] (type-locality, Siam; type in Mus. Phila. Acad.; Doctor Ruschenberger, collector).—Mabuia longicaudata Boulenger, Cat. Liz. Brit. Mus., III, 1887, p. 189.
- 1864. Eumeces siamensis Guenther, Rept. Brit. India, p. 91 (type-locality, Siam; type in Brit. Mus.).—Mabuia siamensis Boulenger, Cat. Liz. Brit. Mus., III, 1887, p. 188 (Siam; Hainan).
- 1867. Euprepes (Tiliqua) bicarinatus Peters, Mon. Ber. Berlin Akad. Wiss., 1867, p. 22 (type-locality, Hongkong; type in Berlin Mus.; Jagor, collector).—

 Tiliqua bicarinata Mueller, Verh. Naturf. Ges. Basel, VIII, Pt. 2, 1887, p. 287 (South Formosa).
- 1886. Euprepes (Tiliqua) ruhstrati Fischer, Abh. Naturw. Ver. Hamburg, IX, no. 6, p. 7, pl. 1, figs. 2a-db (type-locality, South Formosa; type in Oldenburg Mus.; Ruhstraht, collector).

It turns out, as has long been suspected, that Guenther's Eumeces siamensis is the same as Hallowell's Euprepis longicaudata, described eight years earlier, both from Siam. The separation of the two was undoubtedly due to Hallowell's description, which states that the lower eyelid is "scaly with a transparent disc." Mr. James A. G. Rehn, of the Philadelphia Academy Museum, whom I requested to examine the type for me, writes to the contrary: "The lower eyelid of the type of Euprepis longicaudata appears to have a series of four subquadrate scales of rather large size, surrounded by much smaller scales." This removes any doubt concerning the identity of the alleged two species.

There being no specimens of this species accessible to me, I have translated and condensed Doctor Fischer's original description of the type of *Tiliqua ruhstrati* from Formosa. The identity of the latter with the Siamese species is on the authority of Doctor Boulenger.

Description of type specimen.—Adult; Oldenburg Museum; South Formosa; Ruhstrat, collector.—Lower eyelid with a row of four to five large quadrangular scales in the middle; the azygos internasal somewhat broader than long, barely touching the rostral and widely sepa-

a Signifying Long-tailed.

b Reproduced in this work as Plate XVI.



MABUYA LONGICAUDATA FROM FISCHER 1

FOR EXPLANATION OF PLATE SEE PAGE 554.

rated from the frontal by the prefrontals, which are broadly in contact; frontal shield half as wide as long; two fronto-parietals broadly in contact medially; interparietal of same length as fronto-parietals, separating the parietals completely; one pair of nuchals; supraorbitals four, the second in contact with the entire outer edge of the frontal, as large as third and fourth together; nasal elongate, with a semicircular groove behind the nostril; supranasals narrow, barely separated by the internasal; anterior loreal quadrangular, slightly longer than high, in contact with second and third supralabial; second loreal in contact with third supralabial only; seven supralabials, third twice as long as second, fourth largest with parallel vertical edges, situated under the eye; seventh small, scale-like; a single unpaired postmental; ear-opening moderate, with projecting scales overhanging the anterior border; scales in 28 rows around the body, and 26 in a line between axilla and groin, dorsals with two faint keels; a series of preanal scales about twice as large as the preceding series; adpressed limbs overlap with their palms and soles, tip of fourth toe falling considerably short of the axilla. Color above chestnut brown with seven black a longitudinal lines extending down the back along the edges of the scales; a broad black lateral band, sprinkled with a few white spots, from the loreal region, through eye and over ear and shoulder to the beginning of the tail, above narrowly edged with white; below the lateral band scattered black spots; underside greenish yellow.

Dimensions.

	mm.
Tip of snout to vent	100
Tip of snout to posterior edge of ear-opening	23
Fore leg	31
Hind leg	436

Remarks.—Boulenger gives the following measurements of one of the specimens in British Museum: Total length, 340 mm.; tail, 225 mm. His description, apparently based on Siamese and Hainan specimens, agrees in most essentials with Fischer's as given above, the main discrepancy being that the ear-opening is "without projecting lobules," while Fischer repeatedly states the opposite ("Ohroeffnung maessig, ihr Vorderrand von vorragenden Schuppen ueberragt"). Mr. Rehn kindly informs me that in the type of Hallowell's E. longiciudata he found "that no projecting scales are present on the anterior border of the ear-opening." The question then arises whether the Formosan specimens may not represent a distinct species after all. The next question, then, is to which Peters' E. bicarinatus from Hongkong belongs. The original description of Peters contains no reference to the scales surrounding the ear-opening.

In the diagnosis "brown."

Fischer, Abh. Naturw. Ver. Hamburg, IX, no. 6, pp. 7-8.

Habitat.—Southeastern Asia, from Siam to southern China, at least as far as Hongkong, including the islands of Hainan and Formosa.

From the latter it is known through the type specimen of *Euprepes ruhstrati*, which was collected by Herr Ruhstrat in the southern part of the island, a specimen in the Basel Museum recorded by F. Mueller, and a specimen in the British Museum, collected by Mr. La Touche at Bangkimtsing.

Genus SPHENOMORPHUS 4 Fitzinger.

- 1843. Sphenomorphus Fitzinger, Syst. Rept., p. 23 (type, Lygosoma melanopogon Duméril and Bibron.)
- 1845. Hinulia Gray, Cat. Liz. Brit. Mus., p. 74 (type, H. nævia=L. mclanopogon).
- 1845. Otosaurus Gray, Cat. Liz. Brit. Mus., 93 (type, O. cumingii).

Only one species of this genus has hitherto been found in the territory included in this work.

SPHENOMORPHUS INDICUS b (Gray).

Plate XVII, figs. 1-2.

- 1853. Hinulia indica Gray, Ann. Mag. Nat. Hist. (2), XII, Dec., 1853, p. 388 (type-locality, Sikkim, Himalayas; types in Brit. Mus.; Sir J. Hooker, collector).—Lygosoma indicum Boulenger, Cat. Liz. Brit. Mus., III, 1887, p. 241, pl. xvi, figs. 1-1c (Eastern Himalayas, Assam, Burma); Fauna Brit. India, Rept., 1890, p. 195; Proc. Zool. Soc. London, 1899, p. 162 (Kuatun, prov. of Fokien).—Guenther, Ann. Mus. Zool. St. Pétersbourg, I, 1896, p. 203 (Sungpan, Lun-ngan-fu, prov. of Sze-Chuen, China).
- 1893. Lygosoma (Liolepisma) laterale var. recvesi Boettger, Kat. Rept. Mus. Senckenberg., I, p. 104 (part: Dalanshan, near Ningpo) (not of Gray).
- 1894. Lygosoma (Hinulia) indicum Boettger, Ber. Senckenberg. Naturf. Ges., 1894, p. 145 (Dalanshan).

Description. — Young: British Museum No. 99. 4. 24. 101; Bangkimtsing, Formosa; J. D. La Touche, collector. Rostral large, broadly in contact with fronto-nasal, which is in contact with anterior loreal, prefontals, and broadly with the frontal; no supranasals; frontal long, tapering backward almost to a point, in contact with the anterior two large supraoculars; four supraoculars; fronto-parietals and interparietal distinct, the former in contact with second, third, and fourth supraoculars; parietals short, with a short suture behind interparietal; no nuchals; nostril in a single nasal, no postnasal; anterior loreal high, in contact with internasal; 7 supralabials, fifth and sixth largest;

^a From σφήν, a wedge; μορφή, shape.

b Signifying from India.

^c Reproduced in this work on plate XVII, figs. 1-2.



FOR EXPLANATION U. PLATE HEE PAGE 555.



upper large temporal of second row larger than lower; lower eyeld scaly; ear-opening large, though smaller than eye, without lobules; one azygous postmental, or chin-shield; 38 scale rows round the body; scales smooth; 4 preanal scales, median pair largest; longest toe of hind limb reaches elbow of arm stretched backward; soles nearly uniformly granular. Color (in alcohol) above pale olive brown, with numerous small blackish spots arranged in a median scries and a lateral row on each side, the spots of the latter being wider and bordering the upper dorso lateral white band; from eye to above hind legs a broad blackish band with zigzag edges, and a median series of small white dots; above this black band a narrower whitish band and below it a broader white band from shout through ear opening to groin, below this again a dark-brown band with median larger white spots; underside whitish; tail buff, darker above and with pale brownish spots in continuation of the dorsal and lateral bands; legs above brown with rounded pale spots; sutures of labrals marked with lark brown spots.

Primensiona	
Tip of shout to yent	mm. 37
Snout to ear	. 9
For leg	12
Hind leg	. 19

In an adult Chinese specimen (U.S.N.M. No. 35527) before me, with perfect tail, the latter measures 97 mm, from vent to tip, while the distance from tip of shout to vent is 75 mm. The tail of the latter is covered underneath with cycloid scales, the median series of which is irregularly widened transversely some distance behind the vent.

Variation. Judging from Boulenger's description this species has sometimes a postnasul, while the number of scale rows round the middle of the body varies between 38 and 34, the latter number occurring in our Chinese specimen. The specimen described may be abnormal in having the frontal in contact only with first and second supraocular and consequently the fronto-parietal in contact with second supraocular, since Boulenger describes the species as having the frontal in contact with three supraoculars, a condition also found in our Chinese specimen (No. 35527)

Habitat. This is a characteristic Himalayo-Chinese species which extends from the eastern Himalayas, where according to Boulenger it is common in Darjeeling, through the hills of Assam and Burma to China and Tonkin. United States National Museum has it from the province of Shensi, collected by Dr. Eliot Blackwelder, in 1904. It reaches its extreme eastern lumit in Formosa where a specimen, now in the British Museum, was collected at Bangkimitsing by Mr. J. D. La

Touche. I owe the opportunity to examine and describe this addition to the Formosan fauna to the kindness of Dr. G. A. Boulenger.

List of specimens of Sphenomorphus indicus.

Museum.	No.	Age.	Locality.	When col- lected.	By whom collected.
U.S.N.M Brit. Mus	l		Shih Chuen Hsien, Shensi, China Bangkimtsing, Formosa		1

a Description, p. 216.

Genus LEIOLOPISMA a Duméril and Bibron.

- 1839. Leiolopisma Duméril and Bibron, Erpét. Gén., V, p. 742 (type, L. telfairii).
- 1843. Leiolepisma Fitzinger, Syst. Rept., p. 22 (emendation).
- 1843. Lampropholis FITZINGER, Syst. Rept., p. 22 (type, M. guichenoti).
- 1845. Mocoa Gray, Cat. Liz. Brit. Mus., p. 80 (type, M. guichenoti).
- 1845. Lipinia Gray, Cat. Liz. Brit. Mus., p. 84 (type, L. pulchella).
- 1857. Oligosoma Girard, Proc. Phila. Acad., 1857, p. 1967, author's separate, p. 4 (type, O. moco).
- 1864. Liolepisma Peters, Mon. Ber. Berlin Akad. Wiss., 1864, p. 387 (emendation).

The genus, as here understood, is somewhat more restricted than Boulenger's section of the comprehensive genus *Lygosoma* having the same name. The species belong to the Old World, except one which occurs also in North America. This is the only species which occurs in the territory embraced in this work.

LEIOLOPISMA LATERALE b (Say).

- 1823. Scincus lateralis Say, in Long's Exped. Rocky Mts., II, p. 324 (type-locality, bank of the Mississippi River between Cape Girardeau, Missouri, and New Orleans, Louisiana).—Lygosoma lateralis Duméril and Bibron, Erpét. Gén., V, 1839, p. 719.—L. laterale Boulenger, Cat. Liz. Brit. Mus., III, 1885, p. 263 (southern North America; Ningpo, and Szechuen, China); Proc. Zool. Soc. London, 1899, p. 162 (Kuatun, Prov. Fokien).—Leiolopisma laterale Jordan, Man. Vertebr. Anim. North. U. S., 8th ed., 1899, p. 201.
- 1825. Scincus unicolor Harlan, Journ. Phila. Acad. Sci., V, Pt. 1, p. 156 (type-locality, "Southern States"); Pt. 2, 1827, p. 221.
- 1838. Tiliqua recvesii Gray, Ann. Nat. Hist., 11, Dec. 1838, p. 292 (type-locality, China; types in Brit. Mus.; Reeves, collector.)
- 1864. Eumeces modestus Guenther, Rept. Brit. India, p. 87, pl. x, fig. a (type-locality, near Ningpo, China; types in Brit. Mus.).
- 1878. Lygosoma nigropunctatum Bocourt, Ann. Sci. Nat., Zool. (6), VII, art. 16, p. 2 (type-locality, Whampoa, China; types in Paris Mus.; Doctor Vesco, collector).
- 1888. Lygosoma (Liolepisma) laterale var. modesta Boettger, Ber. Senckenberg. Naturf. Ges., 1888, Abhandl., p. 187 (Napier Isl.); 1894, p. 145 (Chapu, near Ningpo).

^a From $\lambda \epsilon \iota o \varsigma$, smooth; $\lambda \acute{o} \pi \iota \sigma \iota \iota \alpha$, covering, envelope.

[•] Signifying lateral; referring to the dark lateral band.

1893. Lygosoma (Liolepisma) laterale var. recessi Borrrger, Kat Rept. Mus. Senekenberg., 1, p. 104 (Peking Chapu Napuer Island Hongkong; Canton); Ber. Senekenberg Naturf (ies. 1901 p. 41 (Tsushima)

Boulenger a failed to find any distinctive characters by which to separate Chinese specimens (the so-called L. reevesii) from North American ones. In the same manner I have been unable, upon the most searching comparison, to discover any difference between the Riu Kiu specimens and typical L. laterale.

Description. Adult; Science College Museum, Tokyo, No. 37; Miyakoshima, Riu Kiu Archipelago (figs. 190-192.) Rostral broadly in contact with fronto-nasal, the portion visible from above much smaller than the latter shield; no supranasals; nostril in the center of a single shield; no postnasal; fronto-nasal, in contact with frontal, broader than long; prefrontals not in contact; anterior loreal in touch with first supralabial, in contact with second supralabial, fronto-parietal and prefrontals; frontal much longer than its distance from tip of snout,

shorter than length of fronto-parietals and interparietal together, very wide in front, tapering nearly to a point behind, in contact with first and second supraoculars; four supraoculars, second largest; fronto-parietals long and narrow, longer than interparietal,



ond largest; fronto-pari- Figs. 190-192 Lindoppisma Laterale. 2 x Nat. 81ZE 190, for etals long and narrow, of Head, 191, side of Head, 192, underside of Head. No 37, 8ct Cold Tokyo

which is shaped like the frontal but not so long; parietals long and narrow, as long as frontal, in contact behind interparietal, four pairs of nuchals, first not in contact; lower evelid granular with a small, transparent disk; seven supralabuls, fifth under the eye, sixth largest; a very large upper temporal, fan shaped with the apex forward, in contact with the entire outer edge of the parietal; ear-opening large, as large as eye, without lobules along the anterior border; a single unpaired pentagonal shield behind the mental; 28 smooth scales around the middle of the body, those on the sides but slightly smaller; two large preanal plates with a small one on each side, hind leg contained about three times in distance from snout to vent; fore and hind legs fail to meet when pressed along the side; 16 lamelle under longest toe; tail cylindric, pointed, with transversely widened plates underneath only towards the tip (in reproduced part). Color (in alcohol) above uniform olive brown; a blackish brown line from nostril through eye. widening on tympanic region and extending above the ear-opening

backward along sides above fore and hind legs to side of tail as a broad dark-brown band above and below narrowly and indistinctly edged with whitish; on the flanks below this edge a paler brown, more indistinct band; underside pale.

Dimensions.

	mm
Total length (tail reproduced)	74
Snout to vent	44
Vent to tip of tail (reproduced)	30
Snout to ear-opening	
Greatest width of head	
Axilla to groin	25
Fore leg	10
Hind leg	15

In specimens with unbroken tail, the length of the latter greatly exceeds the distance from snout to vent; thus in a North American specimen (U.S.N.M. No. 18012; St. Louis, Mo.) measuring 43 mm. from snout to vent, the distance from vent to tip of tail is 61 mm.; hind leg 14.5 mm.

Variation.—Considering the extent of the range of this species the amount of variation is small. The number of scales around the body is said to vary between 26 and 32. In the Asiatic specimens 28 seems to be normal, two specimens recorded by Boettger and two examined by myself having this number. Boulenger records one from Fokien having 26. The most usual color variation is the presence of minute dark-brown spots on the back in more or less regular longitudinal rows.

Habitat.—On the supposition that the American and Asiatic specimens really are identical, the present species has a very unique distribution. In North America it is known to inhabit the lower Austral life zone east of the Rocky Mountains, and is not found west of the latter at all. In Asia it occurs over a large area in China along the coast from near Ningpo to Canton, in the interior to the province of Szechuen, or (if Anderson's Mocoa exigua, a from Momien really is the same species, which seems quite likely) to the extreme west end of the province of Yunnan, while northward it extends its range to the neighborhood of Peking, if the locality which attaches to a specimen in the Museum Senckenbergianum, purchased from the late Dr. Otto Herz in St. Petersburg, really be correct, which I doubt.

From the territory covered by the present work it has been recorded by Doctor Boettger as occurring in Tsushima. A single specimen (No. 37) in the Science College Museum, in Tokyo, is from Miyakoshima, southern group of the Riu Kius, and one in the Ham-

burg Museum (No. 1195) was collected by Doctor Warburg in Okinawa shima.

List of specimens of Leiolopisma laterale

Muscam	Noa	Sex and	Louisety	When conlected	By whom collected	Scale rows.
Bel Coll Tokyo	37	Adaita	M yakoshuna .		Lashiro e'	28
Hum sirg	1195	do	Okinawa shina		Dr. Warburg	28

9 Description, p. 219, figs. 190, 142.

Genus LYGOSAURUS Hallowell

1860. Lygosaurus Waltowell Proc Phila Acad , 1860, p. 496 Appe, L. pello-pleurus.

Only one species known, which is confined to the Riu Kiu Archipelago.

Hallowell's Lygosaurus pellopleurus has been relegated to that vast mass of species (more than 150) which some authors call Lygosoma, and more particularly to the section or subgenus Homolepida. The peculiar scutchation on top of the head, as well as the retractility of the claws, make the retention of the genus Lygosaurus imperative.

In the first place, the parietals have been reduced so in size as to differ but very little in appearance from ordinary nuchals; furthermore, the interparietal, with the parietal foramen, is pushed so far forward that the latter is on a line with or anterior to the posterior edge of the orbit; the frontal is also pushed ahead of its normal posttion so as to separate the prefrontals widely and reduce them to small scutes on the canthus tostralis. Its greater portion overlies, in fact, the nasal bones. Moreover, instead of a single frontal there are two, the posterior frontal being apparently composed of the posterior portion of the original frontal and the anterior portion of the fronto-parietals. It thus comes to pass that the posterior frontal and the interparietal are widely in contact, while the fronto-parietals are as widely separated. My preference to regard this unpaired shield which lies between the supraoculars as a second frontal rather than a third and unpaired fronto-parietal is due to the fact that the two frontals together are in contact with only the two anterior supraoculars, which is the normal arrangement in allied genera with only one frontal. Another reason is the fact that in two specimens examined by me the two frontals are actually fused. This extraordinary arrangement of the cephalic plates will be best understood by a glance at the appended figure (fig. 193). Hallowell's original description should be read in the light of the above interpretation of the scutes, so that his internasal becomes the fronto-nasal, his fronto-nasal is the anterior frontal; his frontal becomes the posterior frontal; his "inte-

[&]quot; From Alyos, flexible (wig, cathos, brard.

parieto-fronto-parietal" is the interparietal; and his fronto-parietals are the true parietals.^a

The digits also show peculiarities which make it inadmissible to incorporate this genus with the typical Lygosoma. The claws appear to be retractile, as in the genus Ristella, though not within a single shield as in the latter, but between a large upper and a lower shield. The digits, moreover, are not covered above with plates, but with imbricate alternating scales on each side of the middle line.

Lygosaurus, so far as recorded, is a genus peculiar to the Riukiu Archipelago, and does not seem to possess any known near relative. Among the skinks reported from the adjacent countries it stands quite isolated. At present one can only suggest that possibly in the future Formosa may prove to possess some related form. It should be noted, however, that Lygosaurus does not seem to belong to the Himalayo-Chinese fauna. Various points in its structure recall south Indian forms rather than any genus or species peculiar to the northern mountains.

LYGOSAURUS PELLOPLEURUS c Hallowell.

Plate XVII, fig. 3.

1860. Lygosaurus pellopleurus Hallowell, Proc. Phila. Acad., 1860, p. 496 (typelocalitics, Amami-o-shima and Okinawa, Riu Kiu Archipelago).—Lygosoma pellopleurum Boulenger, Cat. Liz. Brit. Mus., III, 1887, pp. 319, 512 ("Loo Choo Islands"); Proc. Zool. Soc. London, 1887, p. 147, pl. xviii, fig. 2d ("Loo Choo Islands," Pryer collection).—Okada, Cat. Vert. Japan, 1891, p. 70 (Amami-o-shima; Okinawa shima).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 860; authors' separate, p. 11 (Okinawa).—Brown, Proc. Phila. Acad., 1902, June 11, p. 185 ("Loo Choo Islands").—Lygosoma (Homolepida) pellopleurum Boettger, Offenbach. Ver. Naturk, 33-36 Ber., 1895, p. 107 (Okinawa shima).

a Boulenger offers a homology of the cephalic shields somewhat different from the above (Proc. Zool. Soc. London, 1887, p. 148, footnote), inasmuch as he regards the posterior frontal as an azygous fronto-parietal, and the parietals as split up into an anterior (my fronto-parietals) and a posterior pair. I can not follow him in this. In Science College Museum No. 4 (the one here figured, fig. 193) the suture between the anterior and posterior frontals is obliterated, and so it is in our No. 36527. A single shield formed by a combination of these two would have a striking analogy in the frontal of Chalcidoceps, from Ceylon (Boulenger, Cat. Liz. Brit. Mus., III, 1887, p. 423, pl. xxxvii, fig. 1a) in which it is "angularly emarginate on each side by the first supraocular." In the nearly related Sepophis, from southern India. Boulenger, Cat. Liz. Brit. Mus., XII, p. 423, pl. xxxvii, fig. 2a), the frontal is actually split much in the same way as in Lygosaurus, and Boulenger himself in the diagnosis of the genus speaks of "two frontals." In this genus "fronto-parietals," much in the same relative position as in Lygosaurus, are "present," while the interparietal is nearly identical in shape and relation.

b I have no specimen of Ristella. The arrangement of the claws is described by Boulenger (Cat. Liz. Brit. Mus., III. p. 357) as follows: "Claws completely retractile in a large compressed sheath formed of one large scale cleft inferiorly." Stoliczka first called attention to this character (Journ. Asiat. Soc. Bengal. XLI. Pt. 2, 1872, p. 129), but indicates "retractile claws lying between two terminal enlarged shields." c From πελλός, blackish; πλευρά, side

d Donwoland in this work on Plate

d Reproduced in this work on Plate

Description, -Adult; Science College Museum, Tokyo, No. 4; Shuri, Okinawa shima; July, 1895, Shiraishi, collector (figs, 193-195), Rostral very broadly in contact with fronto-nasal; no supranasals; nostril in a single nasal; no postnasal; fronto-nasal broader than long, broadly in contact with frontal; prefrontals very small, smaller than posterior supraocular and interparietal, widely separated; frontal undivided, very long, twice as long as its distance from tip of snout, angularly emarginate laterally by the anterior supraocular; the anterior portion (corresponding to the anterior frontal in such specimens in which there is a transverse suture between the lateral emarginations) with the longer sides converging posteriorly and in contact with first supraocular, the posterior portion (corresponding to the posterior frontal) with the longer sides diverging posteriorly and in contact with first and second supraoculars, also in contact behind with interparietal; four supraoculars, anterior largest, first and second in contact with frontal (anterior and posterior frontals); frontoparietals not in contact with each other, about as large as third superocular; interparietal about as wide as long, slightly larger than fronto-parietals, in contact with (posterior) frontal; parietals very short, not larger than fronto-nasal, in contact behind interparietal;

no nuchals; loreals small, narrow, their lower edge coextensive with the upper edge of second supralabial; lower eyelid scaly; six supralabials, fifth longest; between fourth and fifth a large subocu-



Figs. 193-195. Lygobat rus pelloplet rus. 2 x nat, size. 193, to 1 of head, 194, side of head, 195, underside of head. No. 4, Sci. Coll. Tokyo

lar, the lower angle of which nearly reaches the edge of the lip; temporals small, scale-like; ear-opening rather large, as large as both loreals together, horizontally oval, without projecting lobules; a single narrow, quadrangular shield, with nearly parallel anterior and posterior edges, behind the mental; submandibulars small, scarcely differentiated; 26 scale rows around the middle of the body, the scales of nearly equal size, those on back strongly tricarinate, the median ones even with two more though fainter keels; preanal scales not enlarged; legs short, lund leg being contained about three and three-fourths times in distance from snout to vent, while fore and hind legs fail to meet by the length of the fore leg; digits very short, first especially so, covered above with imbricate, alternating scales, one on each side of the median line and terminating above in a large nail shaped scal under which the claw can be retracted (in the present specimen near)

concealed, only the extreme point being visible); tail cylindric, tapering to a point; the caudal scales above with four decreasing posteriorly to two keels, no transversely enlarged plates underneath. Color (in alcohol) above pale brown, with a series of narrow elongate dark spots on each of the two median scale rows; a dark brown band from nostril through eye, high above the ear-opening and along the upper part of the sides, disappearing on the sides of the tail; top of head irregularly spotted with dark brown, with larger spots of similar color on upper and lower labials; whole under surface whitish.

Dimensions. mm. Total length: 98 Snout to vent. 52 Vent to tip of tail. 46 Snout to ear-opening. 7.5 Greatest width of head. 6 Axilla to groin. 30 Fore leg. 9

Hind leg...... 14

Variation.—The most noteworthy variation seems to be the presence or absence of a suture dividing the frontal into two distinct shields. In Hallowell's specimen as well as in that described by Boulenger and one in our museum (U.S.N.M. No. 36526) the suture is present, while in the other (No. 36527), as well as the one in Science College Museum, Tokyo (No. 4), the suture is absent. It is consequently not possible at the present to say which condition is the normal one. Otherwise there is not much difference in the head-shields of the specimens before me, except that in No. 36526 the parietals fail to meet behind the interparietal. The size of the car-opening is variable, probably due to the state of preservation of the specimen. Two of the specimens before me have 26 scale rows, and one 28 around the body, while Boulenger gives 24 for his specimen, the same number as recorded by Hallowell.

Habitat.—Apparently confined to the middle and northern groups of the Riu Kiu Archipelago, from both of which the Rodgers expedition brought home specimens which now are lost. Later collectors have obtained it in Okinawa shima. Curiously enough it has not been recorded from the southern group.

List of specimens of Lygosaurus pelloplearus.

Museum.	No.	Sex and age.	Locality.	When collected.	By whom col-	Scale rows.
•				-		
Do	36527	do,#	do		do	28
Sci. Coll. , Tokyo .	-1	Adult 4	Okinawa	July (4895)	Shiraishi	26

Genus CRYPTOBLEPHARUS" Wiegmann.

1834. Cryptoblepharus Wiedmann. Herpet Mex., p. 12 (type, Ablepharus poceilopleurus).

Having recently obtained specimens of the type species of the genus Ablepharus, I have convinced myself that it is not congeneric with the type of Cryptoblepharus b. The arrangement of the supraoculars in the former is so radically different from that of the latter that even if there were no other distinction I should hesitate to place them in the same genus.

In the key to the genera (p. 193) this genus is said to have "no movable lower eyelid." This expression does not mean that the lower eyelid is absent. On the contrary, it is there, but not movable, having coalesced with the rudimentary upper lid. What appears to be the exposed eye itself is only the very large transparent disk of the lower eyelid.

CRYPTOBLEPHARUS BOUTONII C NIGROPUNCTATUS d (Hallowell).

1860. Ablepharus nigropunctatus Hallowell, Proc. Phila Acad. 1860, p. 489 (type-locality Port Lloyd, Bonin Islands, Rodgers collector).

With the number of scale rows of a large series of Hawaiian "snake-eyed skinks" varying between 28 and 30, I can not well refer the ten Bonin Island specimens with 24 and 26 scale rows to the same subspecies, notwithstanding the fact that I find them to agree substantially as to coloration. With the present material insufficient to work out an intelligent and comprehensive review of the various forms clustering around C. boutonii, it is safer to keep the groups separate nomenclaturally. How essential it is to follow this rule is shown by Boulenger's recent notes under Ablepharus boutonii. It is even a question with me whether the Bonin Island form should not be designated binominally on account of the apparently constant presence of a distinct postnasal. The occasional occurrence of such a shield in Hawaiian specimens, however, makes it safer to adhere to the provisionally accepted nomenclature of trinominals for this group of forms.

Hallowell's type of Ablepharus nigropunctatus appears to be lost. It was obtained at Port Lloyd, on Peel Island (Chichishima), of the middle or Beechey Group, Bonin Archipelago, consequently from the same locality from which came U.S.N.M. Nos. 23897-8 and 23900,

σ From κρυπτός, hidden, βλέφαρον eyelid

b See Stejneger, Proc. U. S. Nat. Mus. XXI, no. 1174, 1899, p. 810.

c.1831 Seineus boutona Destartis, Ann. Sci. Nat. 4. XXII. p. 298 (type-beality. Island of Mauritius, types in Paris Mus.). Named for Louis Bouton, a French botanist.

d Spotted with black.

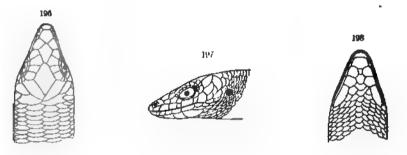
Ann Mus Civ Genova (2) XVIII 1898, pp. 702 and 719.

⁷See Stejneger Proc U S Nat Mus XXI No 1174 1899 p. 811.

²⁶⁴⁸⁵⁻No. 58-07-15

and the three specimens in the Science College Museum, in Tokyo. I have also before me three specimens from Haha shims, in the southern, or Coffin Group, U.S.N.M. Nos. 23899, 33857, and Sci. Coll. Mus. Tokyo No. 48, essentially like the ones from the middle group. These agree pretty well with Hallowell's description, except that he does not mention a pale dorso-lateral line which is more or less apparent in all the specimens mentioned above. A single large specimen (Sci. Coll. Mus. No. 50), probably from Chichi shima, is considerably darker, with scarcely a trace of the lateral line, but the duskiness of this specimen may be due to defective preservation. Of the ten specimens mentioned, six have 24 scale rows around the middle of the body, while four have 26.

Description (figs. 196-198).—Adult; U.S.N.M. No. 33857; Haha shima, Bonin Archipelago; March, 1904; Owston collection. Rostral in contact with fronto-nasal; nostril round, in the lower portion of a rather large, pentagonal nasal; a small triangular postnasal.



Figs. 196-195.—Cryptoblepharus boutonh nigrofunctatus 2 x nat size. 196, top of head; 197, side of head, 198, underside of head. No. 50, Sci Coll. Tokyo.

in contact with nasal, anterior loreal and first supralabial; no supranasal; fronto-nasal slightly broader than long, not in contact with frontal; prefrontals rather large, in contact with each other, with both loreals, and with anterior supraocular; frontal small, considerably smaller than fronto-parietal, in contact with first and second supraoculars; four supraoculars, second largest; four superciliaries; fronto-parietal (consisting of the fused fronto-parietals and interparietal) quadrangular, in contact with frontal and three supraoculars, very large; parietals long and narrow, broadly in contact behind fronto-parietal; one pair of large nuchals, in contact behind parietals, and followed by a double series of short, but very wide plates, or scales, which gradually decrease in width backward, merging into the two median dorsal scale rows; first loreal very high and narrow, in touch with first supralabial behind postnasal; second loreal much lower, pentagonal, in contact with two preoculars; the upper suture of the

o in Hallowell's description "fronto-parietals" is evidently a misprint for fronto-parietal.

supralabials from the rostral to the anterior border of the subocular supralabial deeply depressed, forming a slightly arched groove; eight supralabials, seventh very high, sixth longest, forming a long and low subocular; eye surrounded by granules and above by three elongate narrow scales; a large upper temporal adjoining parietal; earopening round, smaller than eye, without projecting lobules; mental small; a large, pentagonal postmental followed by three pairs of large submandibulars, the last of which is very long; 24 rows of scales around the middle of the back, laterals smallest, and the two median dorsals largest, the dorsals faintly multicarinate; preanal scales somewhat enlarged; hind leg about two and a half times in distance from snout to vent; fore and hind legs when pressed against the sides overlap by more than length of longest toe; tail cylindrical, with a median series of transversely enlarged scales underneath. Color (in alcohol) above pale olive brown, with numerous irregular blackish brown elongated spots, many of which are edged with paler spots; flanks dark brown, with similar pale spots which at the upper edge collect so as to form a somewhat irregular pale dorso-lateral line; legs above like the flanks; lower surface bluish white with scattered dark spots on legs and tail.

Dimensions.

	mm.
Total length	143
Snout to vent	
Vent to tips of tail	89
Snout to ear-opening	10.5
Greatest width of head	8
Axilla to groin	28
Fore leg	17
Hind leg	23

Variation.—There is a great deal of variation in the size and relation of the head shields. Thus in about one-half of the specimens before me the fronto-nasal and the frontal are in touch; on the other hand, the suture between the prefrontals in No. 23897 is so wide as to nearly equal the length of the fronto-nasal, while the frontal is so reduced in size as to equal the anterior supraocular and to lose contact with the frontal parietal, the second supraoculars being in contact behind it. All have a distinct postnasal, but none show signs of a supranasal. The number of supralabials is also slightly variable. In most specimens there are four supralabials in front of the subocular, but in the specimen described above as well as in one of the Chichi shima specimens in the Science College Museum, Tokyo, there are five on both sides. In our No. 23897, from the latter island, there are four on one side and five on the other. The coloration is very variable, not or the ground color, which varies from pale clay color to dark brown, t also in the amount of spotting, some specimens being nearly unspott.

while in others the numerous dots are reddish brown instead of blackish. No. 23897 is densely spotted with blackish underneath, especially under the tail and throat.

Habitat.—The species, of which I consider the Bonin Island specimens to represent a separable form, is now distributed in several slightly deviating varieties or subspecies over nearly the entire tropical island world in the Indian and Pacific oceans, including Australia. It is also found locally on both the eastern and western coasts of Africa.

Whether the present form is found outside the Bonin Archipelago it is impossible to say at present. The one found in the Hawaiian Islands is characterized by a greater number of scale rows, normally 28 to 30.

In the Bonins it has been collected in the largest island of each of the two southern groups.

Mus eum.	No.	Sex and age.	Locality.	Wh collec		By whom collected or from whom re- ceived.	Scale rows.
U.S.N.M		(a ₎	Chichi shima, Bonin	-			_
Do	23900		do	do.			_
Do Do			Haha shima, Bonin				
Do Sci. Coll. Tokyo			do	•		•	_
Do Do		(d) 	Bonin				20 24
Do	?		do		· · · · · · ·	do	20

List of specimens of Cryptoblepharus nigropunctatus.

Family LACERTID.E.

b Description, p. 226.

a P. 227.

c Sci. Coll. No. 48.

d Figs. 196-198.

Pleurodont lizards with scaly or papillose plicate tongue; lower surface with squarish scales in longitudinal and transverse rows.

An Old World family, mostly found in Africa and the western Palearctic region. It is absent in Madagascar and Australia, and in southeastern Asia it is only represented by the genus Takydromus, which is peculiar to that part of the world. Peripheral representatives of two other genera occur in the continental area covered by this work, one of these even reaching the island of Sakhalin.

The species of this family are chiefly terrestrial in their habits.

Genus TAKYDROMUS« Daudin.

- 1803 Takydromus Davidin, Hist. Nat. Rept., III, p. 251 (type, T quadrilineatus)
- 1804 Tachatromas Larrence, Nouv. Duct. d'Hist. Nat., XNIV, tabl., méth., p. 63 com idation.
- 1806 Tachqdeomas Frorige Dumeril's Anal Zool (German transl), p. 83 cemendation
- 1845. Tachysaurus Gray Cut Liz Brit Mus. p. 52 type, T. japonicus)

KEY TO JAPANESE, KOREAN, AND FORMORAN SPECIES OF TAKYDROMUS

- at Dorsal scales small, not arranged in longitudinal series T. dorsalis, p. 229, at Dorsal scales I, rg., arranged in longitudinal series.
 - b) Three pairs of submental shields
 - c1 Walth of head more than half the length of shielded part of head
 - d. One inguinal pore on each side. . T. septentrionalis, p. 232.
 - d- Two inguinal pores on each side. . T formosanus, p. 235.
 - e' Width of head one-half the length of shielded part of head

T smaragdenus, p 236

b2 Four pairs of submontal shields.

- c1 More than one inguinal pore on each side.
 - d Two very rarely three inguinal pores on each side, not more than six rows of emarged dorsals—posterior enlarged throat scales pointed

T tachydromoules, p 238

TAKYDROMUS DORSALIS h Stejneger.

1904. Takydromus dorsalis Streseger Sunthson Quarterly (Mise Coll., XLVII), Nov. 9, 1904. p. 294 "type-locality, Ishigaki shima, Yaeyama Archi pelago Riu Kiu Islands, Japan. type U.S.N.M. No. 34162.

Description Adult male: U.S.N.M No. 34162; Ishigaki shima. Riu Kiu, April-June, 1899; A. Owston collection (figs 199 202). Rostral not in contact with internasal, its upper lateral corner, formed by the suture with the first supralabial, barely entering the nostril; nostril rounded, between two nasals, the anterior being in contact with that of the other side behind the rostral, the posterior in contact with only one supralabial, the first; two loreals, of which the posterior very large; internasal much longer than broad, about three-fourths the length of the prefrontals, which are nearly as long as the frontal; two large supraoculars in contact with frontal; a very small third one behind, which is barely touching the outer corner of the fronto-parietals; supraoculars separated from the superciliaries by a single row of granules, the anterior of which is somewhat enlarged and separates the first supraocular from the posterior loreal, fronto-parietals slightly longer than the internasal, parietals longer than frontal; interparietal sma" narrow; occipital slightly smaller, triangular, six supralabials, the fif

[«] Careless transliteration for Tachqdeomous, from τάχτε, switt, and άμου εξ, running.

b Signifying dorsal, referring to the unique arrangement of the scales on the back

very long and under the eye; temporals small, strongly keeled; a long, narrow shield along the anterior half of the outer edge of the parietal; lower labials very long and narrow; four pairs of submandibulars, or chin-shields, increasing in size posteriorly, anterior two pairs entirely in contact with each other, the third pair posteriorly separated by a small, elongated scale; upper surface of body covered with strongly carinated scales, 28–30 across the middle of the body, those on the back larger, about five corresponding to three ventral plates, gradually merging into

201

Figs. 199 (6). Takydromus dorsalis. 2 × nat size 199, top of head: 200, underside of head. 201, mid-ble of hack; 202, inguinal region. No 3462 U.S.N.M.

the laterals, of which seven to eight correspond to three ventrals: scales on upper neck about the size of smallest laterals; scales on upper surface of limbs large, keeled, larger than largest dorsals, those on forearm being smooth and forming broad transverse plates; gular scales large granules posteriorly, gradually becoming larger and keeled toward the collar, 26 in a series on the median line between third pair of chin-shields and collar; scales on collar large, pointed, keeled, the median pair largest; six rows of ventral plates, median faintly kerled, outer row strongly so. 24 on the median line from collar to preanal plate; preanal plate large, with two minute plates on each side; two ineuinal pores on each side; limbs very long and slender, with very long digits, the longest toe of hind leg stretched forward, reaching the shoulder joint, tail more than three and

a third times as long as head and body together, swollen at base, covered above and below with strongly keeled scales, which are twice as long as the largest dorsals. Color (in alcohol) bluish slate (probably greenish in life), throat paler; a black line from nostril through middle of eye to center of ear-opening; a pale (probably yellowish) line, below this from nostril through lower eyelid to lower edge of ear-opening, and a dusky line, less distinct, bordering the pale line below from middle of subocular labi.

Dimensions.

		201275
Total length		284
Shout to vent		64
Vent to tip of tail		220
Snout to edge of collar		22, 5
Shout to posterior edge of occupital		16
Width of head		-
Fore limb		25
Hend hmb		35

The adult female (U.S.N.M. No 34166; same locality and collector) differs chiefly in having the tail tapering from the beginning without the basal swelling and in somewhat shorter legs, the adpressed hind leg not reaching beyond the axilla.

The young (No. 34169, measuring 38 mm. from snout to vent) is like the female; occipital is not proportionally larger.

Variation. In the ten specimens which are in the National Museum very little individual variation is observed. All have four pairs of chin-shields; all have two inguinal pores on each side, except No. 34163, which has three. All have the nasals in contact behind the rostral. There is some difference in the distinctness of the keels on the ventral plates, due apparently to age, since the larger specimens mens are more distinctly keeled, while in the smaller ones the four median plates are smooth or nearly so.

Remarks. This exceedingly distinct species does not show any near affinity to the other known species of the genus. It is absolutely unique in the arrangement and size of the dorsal scales.

Another character unexpected in so southern a species is the number of submandibular shields. Four chin-shields are found normally only in the northern forms, namely, *T. tachydromoides* and its allies.

The discovery of this novelty in the southern group of the Riu Kiu Archipelago is the more startling, since we have T smaragdinus from Miyakoshima in the same group, a species which conforms in all respects to the general type of the genus. On the other hand, the fact that we have ten specimens of the present species from Ishigaki shima and none of the regular type seems to indicate that the latter may not occur in that island at all.

Habitat.—Apparently confined to the island of Ishigaki, in the southern group of the Riu Kiu Archipelago, where Mr. A. Owston's collector obtained it during the summer of 1899.

List of specimens of Takydromus dorsalis	List o	specimens o	Takydromus	dorsalis.
------------------------------------------	--------	-------------	------------	-----------

S. M. o.	Sex and age.	Locality.	When collected.	By whom collected or from whom received.	
60	Миlе	lshigaki shima	AprJune, 1899	A. Owston	2
61	do	do	do	do	
62	do. a	do	do	do	2
63	do	do	['] do	do	3
64		do			
65	do	do	do	do	2
66	do.b	do	¹do	do	2
67	do	do	[†] do	do	2
		do			
69		do			

a Type; description, p. 229; figs. 199-202.

TAKYDROMUS SEPTENTRIONALIS a Guenther.

1864. Tachydromus septentrionalis Guenther, Rept. Brit. India, p. 69, pl. VII, fig. E (type-locality, Ningpo, China; types in Brit. Mus.); Ann. Mag. Nat. Hist. (6), I, 1888, pp. 166, 167, 168 (Kiukiang; Nankin; Ningpo); Ann. Mus. Zool. St. Pétersbourg, I, 1896, p. 203 (Huihsien, Prov. Kansu).—Boettger, Kat. Rept. Mus. Senckenberg., I, 1893, p. 79 (Lueshan near Kiukiang; Dalanshan, near Ningpo); Ber. Senckenberg. Naturf. Ges., 1894, p. 139 (Lueshan Mts.), p. 145 (Dalanshan Mts. and Tchinhai, near Ningpo).—Boulenger, Proc. Zool. Soc. London, 1899, p. 161 (Kuatun, 3,000-4,000 alt. N. W. Fokien; J. D. La Touche, collector).—Werner, Abh. Bayer. Akad. Wiss. (Muenchen), II Klasse, XXII, Pt. 2, 1904, p. 354 (Ningpo).

Nine specimens (U.S.N.M. Nos. 34170-78) from Taipe, Formosa, appear to be typical *T. septentrionalis* with one inguinal pore on each side and three submandibular shields. They have a moderately broad head and moderately large temporals, about seven in a row between orbit and ear-opening, and in these points as well as in coloration differ from *T. smaragdinus* which normally also has two more rows of large dorsals. I have compared them with two Chinese specimens collected by Dr. Eliot Blackwelder, in the Chin Ling Mountains in the Province of Shansi (U.S.N.M. Nos. 35525-26).

The relations to T. formosanus will be discussed under the latter. Description. Adult male; U.S.N.M. No. 34172; Taipe, Formosa; March, 1903; A. Owston collection. Rostral not in contact with internasal; nostril rounded, between two nasals, the anterior being in contact with that of the other side behind the rostral, the posterior in contact with only one supralabial, the first; two loreals, posterior very large; internasal about as long as broad, a trifle shorter than the prefrontals which are less than three-fifths the length of the frontal; two large supraoculars in contact with frontal; a small posterior supraocular in contact with fronto-parietals; supraoculars separated from the posterior superciliaries by a single row of granules,

b P. 231.

the anterior, very long, superciliary being in contact with the anterior supraocular throughout its whole length, a small shield in front of first supraocular separating it from the posterior loreal, frontoparietals longer than internasal, parietals slightly longer than frontal; interparietal moderate, about as large as anterior supraocular, occapital natch smaller, about the size of third supraocular, seven supralabials, lifth very large, under the eye, temporals moderate, keeled, about 7 in a row between orbit and ear-opening, an clongated shield along the anterior half of the outer edge of the parietal, lower labials long and narrow: three pairs of chin-shields, increasing in size posteriorly, only first pair in contact throughout, second pair posteriorly separated by a wedge of elongated granules; back covered by six series of large keeled scales, three on each side, and two median ones slightly smaller, the keels forming continuous ridges, six of the large scales corresponding in length to five ventral plates; laterals granular, forming a broad longitudinal band on the sides, scales on upper surface of limbs large, keeled, not larger than large dorsals, a series on the forearm being rather widened transverely and smooth; gulars large, granules gradually merging into large, pointed, keeled scales on neck and collar, about 23 granules and scales on the median line between second pair of thin shields and collar, scales on collar long, pointed, and keeled like those on neck and chest, eight rows of ventral plates, which on the posterior part of the abdomen are flanked by two series of larger keeled scales having a row of similar but smaller scales between them; ventral plates all pointed behind and strongly keeled, 29 on the median line from collar to preamal plate, preanal plate large, smooth, with two smaller plates on each side, a single inguinal pore on each side, limbs pioderate, the outstretched hind leg reaching the axilla, tail three and one third times as long as head and body together, swollen at base, covered above and below with strongly keeled scales, which are as large as the largest dorsals. Color (in alcohol) above ohve becoming light tawny-olive on the tail, two narrow blackish brown lines on back along the keels of the first row of larger dorsals on each side of the redian line, these lines continuing some distance on the tail, granular area of the sides of the body dark brownish gray, continued on the sides of the tail as a purrow dusky line, which almost disappears bullway from the tip; a black line from nostril through center of eye, behind the latter two blackish lines, one above along the paractals, the other below through the ear-opening, inclosing between them a lighter brown area postemorly connected with the lateral dark band, an elongated whitish spot on upper eyelid, a narrow whetish line from below nostril through the lower eyeld, over the lower temporal region, through the lower edge of car-opening, to the shoulder where it disappears, a black line on the posterior aspect of the femur and indicated on the tibia, lower surface whitish, suffused with tawny-olive on fail

Dimensions.

Total length	nn.
Fotal length	211
Snout to vent	49
Vent to tip of tail	162
Snout to collar	
Snout to posterior edge of occipital	
Greatest width of head	
Fore leg	
Hind leg	

The female (U.S.N.M. No. 34174, same locality and collector) differs in the tail gradually tapering from the base, and in the shorter hind leg, the tips of the fourth toe scarcely reaching beyond the elbow.

The young (U.S.N.M. No. 34178; snout to vent 31 mm.) is essentially like the female. In this specimen the interparietal is comparatively larger, but the occipital is nearly obsolete. In a Chinese specimen of same size (U.S.N.M. No. 35526) both of these shields are uncommonly large, with a small square shield between them.

Variation.—In the Formosan series of nine specimens there is but little individual variation. All have one inguinal pore; three pairs of chin-shields; six rows of enlarged dorsals; and the nasals broadly in contact or at least touching behind the rostral. None of the specimens, including the Chinese, has any outer accessory dorsal scale row. The color is also essentially alike, except that in several specimens a distinct whitish line on the inner half of the outer dorsal row of scales forms the upper edge of the lateral dark band, while the dorsal median black lines are often absent or obscure.

Habitat.— Widely distributed over eastern China in the mountains, on the coast from Fokien to Ningpo, west to the provinces of Kansu, where it was collected by Berezowski in 1892, and Shensi, where Dr. E. Blackwelder obtained it in 1904.

In Formosa it was taken during March, 1903, by Mr. Owston's collector at Taipe, the specimens being in the United States National Museum.

List of specimens of Takydroneus septentrionalis.

N. M.	x and ge.	Locality.	When collected.	By whom colle cted or from whom received.	Inguinal Pores.
34170 Fem	ale Taipe,	Formosa	Mar., 190	3 A. Owston	1
341716	lo do		do	¦do	1
<u> </u>				. [do	_
ı				do	i -
				' do	
				do	1
				¦do.,	1
			l	¦do	, -
34178 Your	ng <i>b</i> do	• • • • • • • • • • • • • • • • • • • •	do	¦do	1
35525 Fem	ale Liang	Ho, Shensi, China	190-	4 E. Blackwelder	1
35526 You	ng b Hsino	Wang, Shensi, China.	190	4 do	1

TAKYDROMUS FORMOSANUS " Boulenger.

1894 Tachydronius formosanus Bottenger, Ann. Mag. Nat. Hist. (6), XIV. Dec. 1894, p. 452 - type-locality, Taiwan fu, Formosa, types in British Museum, Holst, collector.

There being no specimens of this species in the collections now accessible to me, I reproduce the original description.

Original description. - Head moderately elongate: pasals in contact behind the nostral; a series of granules between the supraoculars and the superciliaries; a small shield separates the large anterior supraocular from the loreal; temporal scales very small and keeled; three pairs of chin-shields; six longitudinal series of large strongly keeled shields, separated on the vertebral line by one or two series of smaller shields; eight or ten series of strongly keeled ventral shields, with two or three series of smaller shields on each side; two inguinal pores on each side. Olive brown above; a dark brown or blackish lateral band from the end of the snout to the base of the tail, passing through the eye, edged below, and usually also above by a whitish streak; the upper light streak, if present; originates above the tympanum and runs along the outer series of dorsal shields; the lower extends from the end of the snout to the thigh, passing through the tympanum and following the upper series of ventro-lateral shields: a whitish, black-edged streak along the hinder side of the hind limb: lower parts whitish.

D_{ℓ}	mensions	
		m.m
Total length		186
Head])
Width of head		- 6
Hody .		44
Fore limb		15
Hind limb		21
Tail	* * *	 122.6

Remarks.—The Formosan grass lizard seems closely related to Taky-dromus septentrionalis Guenther, if indeed distinct, the chief difference being in the latter having only one inguinal pore. This character may or may not be constant, but as Boulenger had "several" specimens with two pores, while, on the other hand, I have nine with one pore only, it may be better to retain T. formosanus separate for the present until examination of a large number of specimens from the type-locality can be made.

Habitat. Recorded only from Formosa, specimens now in the British Museum having been collected by Mr. Holst at Taiwan fu and in the central portion of the island.

⁹ Signifying belonging to Fermosa.

b Boulenger, Ann. Mag. Nat. Hist. b. XIV 1894, pp. 462-463.

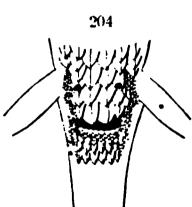
TAKYDROMUS SMARAGDINUS a Boulenger.

1848. Tachysaurus japonicus Adams, Narrat. Voy. Samarang, II, p. 305 ("Miacoshimas") (not of Duméril and Bibron, 1839).

1887. Tachydromus smaragdinus Boulenger, Cat. Liz. Brit. Mus., III, p. 509 (type-locality, "Loochoo Islands;" types in Brit. Mus.; Pryer collection); Proc. Zool. Soc. London, 1887, p. 147, pl. xvii, fig. 2; pl. xviii, fig. 1 (Loochoo).—Guenther, Ann. Mag. Nat. Hist. (6), I, Mar. 1888, p. 168 (Loochoo Ils.).—Okada, Cat. Vert. Japan, 1891, p. 70 (Okinawa).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 859; author's separate, p. 10 (Okinawa).—Boettger, Offenbach. Ver. Naturk. 33–36 Ber., 1895, p. 107 (Okinawa shima).—Brown, Proc. Phila. Acad., 1902, June 11, p. 184 (O-shima or Okinawa shima).—Schenkel, Verh. Naturf. Ges. Basel, XIII, Pt. 1, p. 186 (Okinawa).

Description (figs. 203-204).—Adult male; U.S.N.M. No. 16361; Great Loo Choo Island; May, 1853; W. Heine, collector. Rostral not in





FIGS. 203-204. - TAKYDRO-MUS SMARAGDINUS. 2 M NAT. SIZE. 203, UNDER-SIDZ OF HEAD; 204, IN-GUINAL REGION. NO. 36521, U.S.N.M.

contact with internasal, the anterior nasals being in contact behind the rostral; posterior loreal twice as large as anterior; internasal longer than broad, shorter than prefrontals which are more than threefifths and less than three-fourths the length of the frontal; two large supraoculars in contact with frontal; a small posterior supraocular in contact with fronto-parietals; supraoculars separated from the posterior superciliaries by a single row of granules, the anterior superciliary, which is very long, being in contact with the anterior supraocular throughout its whole length; a small shield in front of first supraocular, separating it from the posterior loreal; fronto-parietals longer than internasal, as long as prefrontals; parietals longer than frontal; interparietal small, very much smaller than anterior supraocular; occipital small, scarcely larger than posterior supraocular; nine supralabials, of which sixth (on right side, fifth on left side) is under the eye, and much longer and higher than the others, its anterior portion overlying the labial

anterior to it; temporals small, slightly keeled, about 12 in a row between orbit and ear-opening; an elongated narrow shield along the anterior portion of the outer edge of parietals; three pairs of chin-shields, increasing in size posteriorly, only first pair in contact throughout, second pair posteriorly separated by a single elongated scale; dorsal scales in eight longitudinal series of larger scales, four on each side, and two median rows of smaller scales, all keeled, the keels of the larger scales forming continuous, nearly parallel ridges, five of the large dorsals corresponding in length to four ventral plates; laterals granu-

lar, forming a broad band; gulars large granules posteriorly, merging into large, pointed, keeled scales, covering the lower neck and collar, about 26 granules and scales on the median line between second pair of chin-shields and collar; six rows of ventral plates, each strongly keeled and somewhat pointed, especially those in front and behind, 26 on the median line between collar and preanal plate; a series of somewhat enlarged, keeled scales on each side of the abdomen, separated from the outer row of ventral plates by two or three rows of smaller keeled scales or granules; preanal plate large, with two keels, with a small keeled scale on each side; a single inquinal pore on each side; legs long, extended foreleg reaching the shoulder; tail three and a third times as long as head and body together, swollen at base, tapering nearly to a point, and covered above and below with strongly keeled scales, larger than the largest dorsals, about four of the former corresponding to six of the latter. Color (in alcohol) above greenish slate (in life said to be "emerald-green"); a narrow black line from middle of lores through eye and over lower temporal region, through ear to shoulder, bordering above a bright vellow stripe on the upper labials, through lower part of ear over shoulder and on the sides to the anterior side of the femur, following the enlarged series of scales on the tlanks: vellow stripe continued behind femur on sides of basal portion of tail; under side greenish yellow, the green occupying lower half of subocular and labial behind it.

Digaresions.	
	mm
Total length	150
Shout to yent	45
Yent to tap of fail	105
Snout to collar	16
Shout to posterior edge of coupital	12
Greatest width of head	5.5
Fore leg	17
Hind leg	23

The female (U.S.N.M. No. 16360; same locality and collector) differs in having the preanal shield divided so that each half forms a large, strongly keeled scale, which is pointed behind; the base of the tail tapering, not swollen.

Variation.—The characters of this species are fairly constant. Thus far three pairs of chin-shields and one ingumal pore have been found in all the specimens examined. The small shield between the first supraocular and the loreal is not always present, and judging from Boulenger's original description the series of granules separating the supraoculars from the superciliaries is not always complete. The number of longitudinal dorsal scale rows is rather variable. In the of the specimens examined by me analytic from Okinawa and fen from Miyakoshima there were four large rows on each side with a small ones between, while one (fer tale from Okinawa) has three to

ones and the intervening two rows rather larger than in the other two specimens. Boulenger also describes the species as having only three enlarged dorsal rows on each side. He furthermore describes it as having eight rows of large ventrals, while the three specimens examined by me only have six. From his description it also appears that some of the females have the preanal plate undivided.

In the two females examined by me there are three rows of small, subequal, keeled scales on each side of the outer row of large ventrals instead of the one enlarged row and intervening small scales or granules as described in the male. Whether this difference is sexual or individual I am unable to say.

Remarks.—The present species, by having only three pairs of submental shields or chin-shields, clearly belongs to the southern group of species constituting this genus, such as T. formosanus, T. septentrionalis, etc., as distinguished from the forms with four chin-shields inhabiting more northern localities, such as T. tachydromoides in Japan and T. amurensis in Korea. It is also probably most nearly related to the former, its chief distinction from T. septentrionalis being its much more slender and elongated build.

Habitat.—Although first collected by W. Heine in May, 1853, during Perry's visit to Okinawa shima, this species was not made known until 1887, when Boulenger described and figured specimens obtained by Pryer in the Riu Kius. In point of fact it was observed even earlier, for Doctor Adams mentions having seen it on the Sakishima group when surveying there in 1845. From the latter islands we have a specimen collected in Miyakoshima obtained from the Science College Museum in Tokyo.

* * .	^	•		777 7 7	7 *
	01 8	Decimens	()[Takydromus .	ราบกรดกกล่างการ
211316	1// 1/	*** * * *** * ***	` ' '		()

U.S. N.M. No.	Sex.	Locality.	When collected.	By whom collected or from whom received.	Inguinal pores.
1 6 360 16361	Male b	Great Loo Choododo	do	do	1
36521	Female c	Miyakoshima		Sci. Coll., Tokyo	

TAKYDROMUS TACHYDROMOIDES a (Schlegel)

KANAHEBI.

Plate XVIII.

1838. Lacerta tachydromoides Schlegel, Fauna Jap. Rept., pp. 101, 139; Saur. & Batr., pl. 1, figs. 5-7 b (type-locality, Nagasaki; types in Leiden Mus.; Siebold, collector).—Fritze, Mitth. Deutsch. Ges. Ost-Asiens, V, 1891, p. 239 (Yezo).—Tachydromus tachydromoides Boulenger, Cat. Liz. Brit. Mus., III, 1887, pp. 5, 509 (part: Japan; Yokohama; Hakone Lake;

a From Tachydromus and $\epsilon i\delta \eta \varsigma$, similar, like.

b Reproduced in this work on Plate XVIII.

Miyanoshta) - Guenther, Ann Mag. Nat Hist (6), I, Mar., 1888, р. 169 (Јаран).—Окара, Cat Vert Јар., 1891, р. 70 Токуо Оshima, Hakone Mts.).—Воеттоел, Kat Rept Mus Senckenberg, I, 1893, р. 79 (Naga-saki, Yokohama Yezo)

1839 Tachydromus japonicus Duméril and Bibros, Erpét. Gén., V. p. 161 ctype locality. Japan, Types in Mus. Paris, Siebold. collector. —Dimeril, Cat. Mét. Rept. Mus. Paris, I, 1851, p. 118 (Japan. —Hallowell, Proc. Phila Acad., 1860, p. 495 (Ushima Idzi., Hilloendorf Sitz. Ber. Berlin, Naturf. Fr., 1880, p. 112 (Tokyo, Hakodate., Tachysancus japonicus (tray., Cat. Liz., Brit. Mus., 1845, p. 52. Japan.) Martins, Preuss. Exped. Ost-Asien, Zool., I, 1866, p. 111 (Yokohama)

1860. Tachydromus scilineatus Hallowell, Proc Phila Acad. 1800, p. 495 not

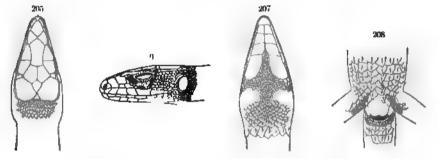
of Daudin) Simoda,

1895 Tachydromus holsti Boulenger, Proc. Zool, Soc. London, 1894, p. 733, pl. xiix, figs. 1 1b. (type-locality, Mt. Ousen, near Shimabara Prov. Hizen Kuista, types in Brit. Mus. No. 94, 1-25-8-32, Helst, collectors.

Takydromus sexlineatus Daudin is sometimes doubtfully attributed to Japan, apparently on Hallowell's authority a who among his Japanese specimens distinguished some as T. sexlineatus and others as T. japonicus. Only the former are now in the National Museum (No. 7310, five specimens from Simoda), and I can affirm that they are nothing but the regular T. tachydromoides. They have the median dorsal scales rather small and the ventral scales are well carinated; hence probably Hallowell's identification.

Description (figs. 205-208) Adult male; U.S.N.M. No. 31844; Yamagawa, Prov. of Satsuma, Kiusiu; June 14, 1904; Dr. Hugh, M. Smith, collector. Rostral scarcely in touch with internasal, not entering nostril, first supralabial enters nostril, anterior nasals barely in touch behind rostral; posterior loreal not much larger than anterior; internasal shorter than prefrontals which are nearly three-liftles the length of the frontal; two large supraoculars, the anterior separated by a small scute from the posterior loreal, the second followed by a small third supraocular; anterior superciliary in contact with first large supraocular, the others separated from the supraoculars by a single series of granules; frontoparietals in contact with posterior supraoculars, slightly longer than the prefrontals; parietals shorter than frontal; interparietal about one-fourth the size of anterior supraocular; occipital small, about the size of third supraocular; eight supralabuals, fifth (on right side, sixth on left side) under the eye, its upper, or orbital edge nearly three times as long as its lower, or labial, edge; temporals rather large, keeled, about six in a row between orbit and ear-opening; an elongated shield, followed by two smaller ones along the outer half of the parietal, four pairs of chin-shields, increasing in size posteriorly, first two pairs in contact throughout, the third only in contact anteriorly, separated posteriorly by a wedge of granules six series of large keeled dorsal scales, three on each side of medialine, with a small interrupted median series consisting of keeled scale

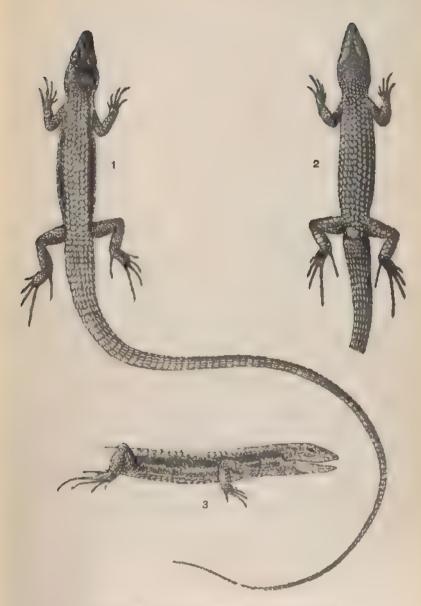
less than one-sixth the size of the others; keels of large scales forming continuous ridges, four of the large dorsals corresponding in length to about four and a half ventral plates; sides covered with minute keeled scales or large granules; scales on upper surface of limbs like dorsals, those on fore legs smaller, on hind legs of the same size; gulars granular, merging gradually into the pointed and keeled scales which cover lower neck and collar, about 23 granules and scales on the median line between third pair of chin-shields and collar; eight rows of ventral plates, the outer rows on each side smaller, the anterior ones somewhat keeled and pointed posteriorly, 27 on the median line from collar to preanal plate; adjoining the ventral plates on each side of the middle portion of the body three rows of small keeled scales which anteriorly and posteriorly grade into the lateral granules; preanal plate large, smooth, with two smaller plates on each side; two inguinal pores on each side; limbs moderate, the outstretched hind leg reaching the axilla; tail less than three times (about two and



Figs. 205-208.—Takydbomus tachydromoides. 2×nat. size. 205, top of head; 206, side of bead; 207, underside of head. 208, inguinal region. No. 7310, U.S.N.M.

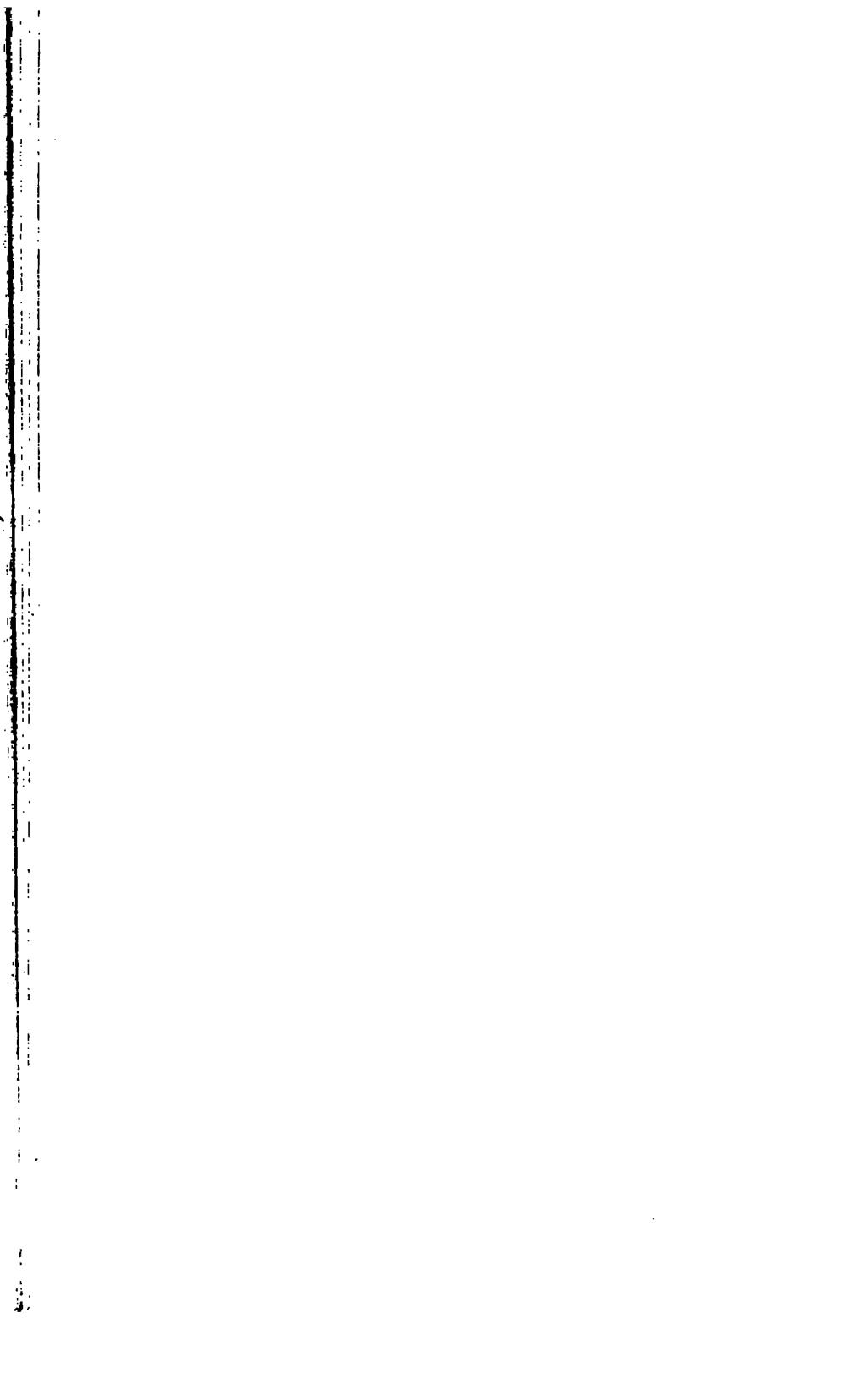
two-thirds times) as long as head and body together, swollen at base, covered with strongly keeled scales which are about as long as the largest dorsals. Color (in alcohol)* on back olive brown with black tips to the scales forming two interrupted dorsal bands continued on the tail, a median series of ill-defined blotches and a dorso-lateral stripe on each side on the outer half of the outer row of large dorsals; in the inner half of this row a poorly defined pale stripe; a narrow black stripe from nostril through eye, narrowly rimming both eyelids, bifurcating behind the eye, the upper branch continuing backward and joining the dorso-lateral stripe, the lower proceeding obliquely through the ear-opening, over the shoulder and along the sides to the groin; the continuation of this stripe visible behind the femur on the side of the base of the tail as a series of black spots; below this black stripe a somewhat wider white stripe which becomes irregular on the

q In Sumpson's MS, catalogue the Sanoda specimens (May, 1855) are described in life as "above dark coppery-brown, below white thic white leads."



TAKYDROMUS TACHYDROMO DES. FROM SCHLEGEL.

FOR EXPLANATION OF PLATE SEE PAGE 555.



flanks and stops at the groin, and below this another black -tries from the upper edge of the subocular; upper side of limbs with blackish reticulations; supralabials obscurely marked with dusky; lower -115 whitish.

Dimensions.

	•
Total length	247
Snout to vent	
Vent to tip of tail	
Snout to collar	
Snout to posterior edge of occipital	1.5
Snout to ear-opening	15
Greatest width of head	
Fore leg	
Hind leg	200 M

The female (U.S.N.M. No. 31841, same locality and collector wiffers in the tail tapering from the base which is not swollen; the him has are also shorter, the tip of the longest toe of extended hind leg barely reaches beyond the elbow.

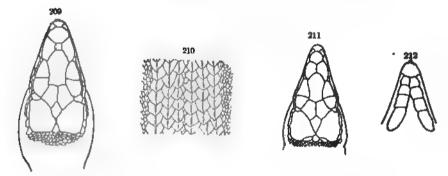
In the young (U.S.N.M. Nos. 13748, 13749, from shout to very respectively, 20 and 24 mm.) the interparietal is relatively very larger being as large as or larger than the internasal.

Variation.—The number of chin-shields, or submandibulars, seems to be subject to less variation than almost any other character, there being four pairs in all the 66 specimens examined by me, except No. 31842, which has five irregular pairs, and No. 31889, which has ally three, but showing indication of fusion between the two anterest pairs.^a

The number of inguinal pores is also very constant, all the 66 street mens having two on each side. Only two specimens (Nos. 12714 stail 31886) show indication of a third pore on one side, the scale next to the outer pore on one side having a minute dusky spot. Doctor thienther states, however, that he has seen a specimen with three verest and if the figure of this species in Fauna Japonica is correct we have

exception to the rule that T. septentrionalis has three chin-shields endy, as fusion or accidental division, as shown by the figure p. 162. The transfer shows a specimen with three chin-shields on one side and four entity reason why the abnormality is considered not due to fusion or division is which assymmetric arrangement, inasmuch as the suture between the seconds behind and the shield anterior to it on each side are not on a line with a assumption being that these sutures always correspond in to the seconds three or four pairs, respectively. Such is not always the case, however as from the accompanying figure from a specimen (No. 2050) brought Yokohama (fig. 212). If in this specimen the first two shields entitled the result would be exactly like the one figured by Beule 2.

another to record. The carination of the ventrals, gulars, and temporals is quite variable, but seems to be strongest in the younger specimens; in the one from Sapporo. Yezo (No. 23437), a very large male, even the gulars are smooth. This specimen also has one or two of the central temporals greatly enlarged and smooth. The number of longitudinal rows of dorsals is also subject to considerable variation, the common arrangement being three enlarged series on each side with a single or sometimes double series of very small keeled scales between the two median rows; these scales in case of a single series alternating on the right and left side of the middle line; in a number of specimens, however, there are only two series of very large scales on each side with a double series of smaller ones between them, but in this case the median scales are considerably larger than where there are three large series on each side. There is also considerable variation in the way the rostral, fronto-nasal, and nasals meet (though in most cases the



Figs. 200-212.—Taktdromus taceydromoides. 2 × nat. size. 209, top of head; 210, middle of back. (No. 23437, U.S.N.M.) 211, top of head; (No. 13753, U.S.N.M.) 212, chin-shields. No. 23539, U.S.N.M.

rostral and fronto-nasal are broadly in contact), as well as in the relation between the fronto-nasal and the frontal, there being sometimes a small unpaired squarish shield interpolated between these two shields and the prefrontals. Finally we may note that the granules between the supraoculars and the superciliaries are subject to considerable variation. While in most specimens the anterior elongate superciliary is followed by a continuous series of granules which separate the second supraocular from the superciliaries, this series is often broken. In one specimen (No. 13753, fig. 211) it is reduced to such an extent that the second supraocular is entirely in contact with the superciliaries, the two granules left only separating the posterior end of the first supraocular from the latter, and in another (No. 34143, one out of a lot of 20 from Mount Fuji) both supraoculars are in contact throughout with the superciliaries, being a perfect T. holsti in this respect. On the other hand, in one specimen (No. 23437) the one

from Yezo, and in many of the specimens from Kiusiu and Shikoku, the granules are so much developed as to entirely separate both the first and the second supraoculars from the outer series of elongated supercularies (fig. 209). In the majority of the specimens from the southern lowland localities I also find several granules bordering the anterior end of the first large supraocular. In the Hondo specimens there is a greater uniformity inasmuch as in nearly every one of these the first large supraocular is broadly in contact with the long supraciliary. There is not enough constancy in these characters to base a separation upon them, and it should be noted that the relation of these shields in the southern specimens tends in a direction away from T. holsti rather than toward it.^a

The coloration varies considerably; the male described above shows almost a maximum of dark and light markings, the female has the markings nearly obsolete except on the sides of the head; between these extremes there are all transitional stages, though the females are less heavily marked than the males; in many specimens the pale dorso-lateral line is more definitely marked than in the one described; in others it is more or less broken up by dark spots from the adjoining dorso-lateral black line; the sides are often solidly dark brown, in other specimens again more or less marked with pale or whitish spots.

Habitat. The present form of grass lizard is apparently restricted to Japan proper. The range was formerly thought to include the adjacent portions of the mainland, but these are inhabited by other species, such as T. septentrionalis and T. wolteri, with which it was at one time confounded.

The types came from the neighborhood of Nagasaki, and it is a curious fact that von Siebold and Buerger failed to get specimens outside of Kiusiu. It is, nevertheless, rather common in Hondo; thus specimens are recorded from Yokohama, Tokyo, Simoda, Oshima, and the region around Hakone Lake. Yezo specimens are also in various museums, and our National Museum has a fine one from Sapporo, Yezo, thanks to the kindness of Doctor Nozawa.

Dr. Hugh M. Smith collected a fine series of specimens both at Yamagawa, at the entrance of the Bay of Kagoshima, Kiusiu, as well as near Kochi, on the southern coast of Shikoku, the first record from this island.

Four specimens (U.S.N.M. Nos. 34179 to 34183), absolutely indistinguishable from those collected near Yokohama, are labeled by Mr. Owston, from whom the National Museum recently acquired

n Since writing the above I have had an opportunity to examine the type specimens of T bolste thanks to the kindness of Doctor Bealenger. This examination substantiates what is said above, and Doctor Boulenger agrees now with me that the specimens do not represent a separable form.

them, as coming from "Northern Formosa, June 23, 1903." Needless to say some mistake has been made in labeling and that they never were collected in Formosa. In all probability they became confused with a specimen of *Natrix piscator* credited to "Mount Fiji," and the lizards were really collected near or on this mountain during August, 1898. (See under *Natrix piscator*, p. 290.)

List of specimens of Takydromus tachydromoides.

Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected.	Inguinal pores.
U.S.N.M	7310a	Adulta	Simoda, Hondo	May, 1855	W. Stimpson	
Do	7310b	do	:do	do	do	:
Do	7310c	do	do	do	.;do	' :
Do	7310d	do	do	do	do	
Do	7310e	do	do	do	do	! :
Do	11332	Young	Japan	1878	E. S. Morse	1
Do	11333	do	do	1878	do	
Do	11334	Male	do	1878	do	! :
Do	12714	do.b	[Yokohama]	Apr., 1881	P. L. Jouy	2-3
Do	13748	Young	do	do	.'do	' :
Do	13749	do	do	do	.ˈdo	1
Do	13752	Female	do	do	.'do	<u>'</u>
Do	13753	do.¢	do	do	do	' :
Do	23335	do	Yokohama	Sept., 1896	L. Stejneger	1
Do	23437	1	Sapporo, Yezo			
Do	23539	1	Yokohama	1		1
Do	30732		Miyazaki, Kiusiu	ŀ	1	
Do	30733	ł	do	_		
Do	30740	_	do	ì	•	
Do	31797	ŀ	Onomachi, Aki, Hondo			•
Do			Yamagawa, Kiusiu			!
Do	31838		do	-	1	
Do	31839	1	do			
Do	31840	1	do	1		
Do	31841		do	1		
Do	31842		do	1		
Do	31843		do			_
Do			do			
Do	31845	_	do			1
Do			Kochi, Shikoku			!
Do			do			
Do			do		I .	
Do			do			
Do	31888		do			
Do	31889	•	do			
Do	34140		Mount Fuji		T.	
Do			do	t and the second		1
Do	34142		do			
Do	34143		do			
Do			do			ı
170.			do			1

a P. 240; figs, 205-208.

^b P. 241.

cP. 242; fig. 211.

d P. 242; figs. 209,210.

e P. 242; fig. 212.

f 5 pairs of chin-shields.

g Description, p. 239.

h3 pairs of chin-shields. &P. 242.

List of specimens of	Takydromus	tachydromoides-	-Continued.
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Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected.	Inguinal pores.
U.S.N.M	34146	Female	Mount Fuji	Aug., 1898	A. Owston	
Do	34147		do	1		1
Do	34148	i e	do		1	1
Do	34149	Male	do	do	do	1 2
Do	34150	do	do	do	do	! 4
Do	34151	Female	do	do	do	! :
Do	34152	Male	do	do	do	` 2
Do	34153	Female	do	do	do	. :
Do	34154	do	do	do	do	2
Do	34155	Male	do	do	do	1
Do	34156	Female	do	do	do	' 2
Do	34157	Male	do	.ldo	do	. 2
Do	34158	Female	do	do	do	1 2
Do	34159	Male	do	do	do	! :
Do	34179	Female	do[?]	[Aug., 1898?]	do	:
Do	34180	1	do	1 -	,	,
Do	34181	do	 do	do	d o	! :
Do	34182	Male	do	do	do	: 2
Do	34183	do	do	do	do	! :
Do	34184	Female	Yokohama	Aug., 1884	do	
Do	36536		Hondo	- •		1
Do	36537		do			
Do			do			
Do		l	do			
Brit. Mus		l	Mount Onsen, Kiusiu.	1		
			do	4	1	

Sci. Coll. No. 53.

b Types of T. holsti.

TAKYDROMUS AMURENSIS a Peters.

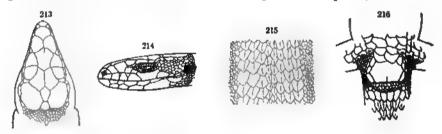
1881. Tachydromus amurensis Peters, Sitz. Ber. Berlin Naturf. Fr., 1881, p. 71 (type-locality, Kossakewitcha, Amurland; type, Berlin Mus. No. 9869).— Fischer, Jahrb. Hamburg. Wiss. Anst., II, 1885, p. 84.—Boulenger, Cat. Liz. Brit. Mus., III, 1887, p. 6 (Kossakewitcha, Amurland); Ann. Mag. Nat. Hist. (6), V, Feb. 1890, p. 137 (Khabarovka; Doerries, collector).—Mueller, Verh. Naturf. Ges. Basel, VIII, Pt. 2, 1887, p. 285 (Khabarovka).—Guenther, Ann. Mag. Nat. Hist. (6), I, March 1888, pp. 168, 169 (Amurland).—Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, No. 1, 1905, p. 92 (Ussuri; Vladivostok).

The introduction of *T. amurensis* into the Korean fauna is based upon a specimen (No. 21185, U.S.N.M., figs. 213-216) collected by the late P. L. Jouy in 1883 (no definite locality). It agrees in every particular, except one, with the various descriptions of *T. amurensis*, widely differing from *T. tachydromoides*. It has 3 inguinal pores on each side; dorsal scales in 8 rows, the median ones but slightly smaller than the others; the toes are shorter, the fourth toe from base of

third, for instance, is not longer than the width of the head; the larger scales on fore neck, as well as those forming the collar, are wider, rounded at the end and smooth; no row of granules between supraoculars and superciliaries, only one or two isolated granules on the right side; on one side 1 scale between first supraocular and loreal, on the other 2; 4 pairs of submentals; 4 keels on upper surface of tail; color above brownish olive with black spots, below whitish, but with no trace of any white band between eye and ear and beyond.

The only difference between Boulenger's descriptions of the type from Kossakewitcha, on the Amur, and four specimens from Khabarovka, which expressly state that the temporals are "perfectly smooth," consists in these scales being obtusely keeled in our specimen.

On the other hand, were it not for the 3 inguinal pores, our specimens might with equal propriety be referred to *T. wolteri*, originally described from Korea (Chemulpo). The latter has only one inguinal pore on each side. Fischer, in the original description, does not



Figs. 213-218.- Takudromus amurensis. 2 × Nat. size. 213, top of head. 214. side of head; 215, middle of back. 216. inguinal region No. 21185, U.S.N.M.

mention whether the temporals are keeled or smooth, but from the fact that Boulenger, with the type before him, refers it to *T. tachy-dromoides*. I feel justified in inferring that it has keeled temporals. However, as I find a great difference in the amount of carination of the temporals in typical Japanese *T tachydromoides*. I am inclined to place but little faith in this character.

The question then arises whether in reality T. wolteri is distinct from T. amurensis. The material is as yet too scant G specimens in British Museum, viz, the type from Chemulpo, one specimen from Kiukiang, China, and one from an unknown locality; Guenther, Ann. Mag. Nat. Hist. (6), I, 1888, p. 168) to permit any authoritative decision, and I therefore abide provisionally by that of Doctor Guenther and recognize it as distinct, although with considerable cloubt.

A detailed description seems superfluous after the above remarks.

Habitat. -T. amurensis has been recorded so far only from the

Amur district. In addition to the specimens from Kossakewitcha

and Khabarovka, it has been collected by Maximowitch in 1864 at the rivers Olakha (Ussuri) and Dadsoshu, and by Pleske at Vladivostok in 1883

Its occurrence in Korea is mentioned here for the first time.

List of specimens of Takydromies amutensis.

U.S. N.M. No	Bex	faculity	When rol lected	By whom collected.	Inguinal
21185	Femule o	Korea	1883	P. L. Jouy	3

Figs 213 20a

TAKYDROMUS WOLTERIa Fischer.

1885 Tachydronnas wolter: Fischer Jahrb Wiss Anst Hamburg, II, p. 82 (type-locality, Chemulpo Korea type in Brit Mus.) Mueller, Verh Naturf, Ges Basel, VIII, Pt. 2, 1887, p. 285 Scoul, Korea) Guenther, Ann Mag Nat Hist (6) I March 1888, pp. 168, 169 (Kiukiang, China).

For the status of this species see the remarks under *T. amurensis*, from which it is said to differ by having only one inguinal pore on each side and a very distinct white lateral band from eye backward.

T. wolteri was reduced by Boulenger to a synonym of T. tachydromoides at a time when in the latter he also included T septentrionalis. He has since admitted the distinctness of T. septentrionalis, but there is apparently no record of where he would place T. wolteri. It can not well go with T septentrionalis because of its four pairs of chinshields. On the other hand, it seems impossible to join it to T. tachydromoides, as it has eight subequal dorsal rows. This latter character links it distinctly with T amurensis. One of the characters by which the original describer, Doctor Fischer, attempted to separate it from the latter, viz, the comparatively large size of the median dorsal series, is not a valid character, as our Korean specimen of T. amurensis has all the dorsal rows subequal concomitant with three inguinal pores.

Habitat T. wolteri was originally described from a specimen collected at Chemulpo, Korea, and Mueller states that one specimen from Seoul is in the Basel Museum. Doctor Guenther has since recorded another from Kiukiang, east central China, but it is probably permissible to suggest that the latter may be a T. septentrionalis with an abnormal number of chin-shields

Genus EREMIAS b Wiegmann.

1834 Eremias Wiegmann Herpet. Mex p 9 (type, Lacerta relox).

1841 .1spidorhunus Eichward Fauna Casp .Cauc .p 74) same type).

o For Mr. C Wolter, who collected at Chemulpo b From epiquids, alone, lonely.

EREMIAS ARGUSa Peters.

1859. ? Eremias velox Maack, Putesch. na Amur (p. 152) (Amurland) (not of Pallas). 1869. Ercnias argus Peters, Mon. Ber. Berlin Akad. Wiss., 1869. p. 61, pl. —, fig. 3 (type-locality, Chefu, China; types, Berlin Mus. No. 4532; Schottmueller, collector). Steindachner, Sitz. Ber. Wien Akad. Wiss., Math.-Naturw. Cl., LXII, Pt. 1, 1870, p. 336; author's separate, p. 11, pl. 11, figs. 1, 2 (Peking).- Martens. Preuss. Exped. Ost-Asien, Zool., I, 1876, p. 375 (Chefu).- - Moellendorff, Journ. N. China, Br. R. Asiat. Soc. (n. s.), 1877, p. 103 (Peking).—MUELLER, Verh. Naturf. Ges. Basel, VIII, Pt. 2, 1887, p. 286 (Chemulpo, Korea).—Boulenger, Cat. Liz. Brit. Mus., III, 1887, p. 102 (part: Chefu; Peking; Manchuria?); Ann. Mag. Nat. Hist. (6), V, Feb., 1890, p. 138 (Manchuria).—Boettger, Offenbach. Ver. Naturk. 26-28 Ber., 1888, pp. 63, 122 (Miau-feng-shan, Peking; Herz, collector); Kat. Rept. Mus. Senckenberg., I, 1893, p. 94.—Fischer, Jahrb. Hamburg Wiss. Anst., V, 1888, p. 46 (eastern Mongolia).—Stone. Proc. Phila. Acad., 1899, p. 184 (Khingan Mts., eastern Mongolia).—Werner, Abh. Bayer. Akad. Wiss. Muenchen, II Klasse, XXII, Pt. 2, 1904, p. 354 (Tsingtau and Kiautschou, China).—Nikolski; Zap. Imp. Akad. Nauk, S. Peterburg, (8) XVII, No. 1, 1905, p. 167 (Mongolia, Manchuria, Korea). Podarces (Eremias) argus Strauch, in Przevalski's Mongoliya i Strana Tangutov, III, 1876, p. 30 (Ordos).

Whatever opinion one may hold about the status of *Eremias* brenchleyib there can be but little doubt that our specimens from Korea are typical E, argus, as the subocular rests on several suprabability without reaching the lip; fronto-parietals are larger than second supraocular; the lower nasal does not reach the rostral, except in No. 21184; the number of scales or granules in a row between parietals and lip is about 10; the number of granules and ventrals in a row around the middle of the body between 65 and 71. Moreover, the coloration is typically that of E, argus, with two well developed median dorsal rows of ocelli and no lateral dark band. The scutellation on top of the head is exactly as figured by Peters, except that the smallest specimen has a second scale between the prefrontals, but it is so small as to scarcely be more than a granule. Our specimens also agree closely with Steindachner's figures of a specimen from Peking.

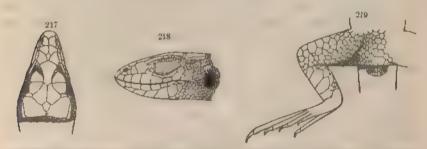
[&]quot;From " top os, the many-eyed Argus, slain by Hermes; referring to the many occllated epot of this species.

^{**}Etemias brenchleyi* Guenther, Ann. Mag. Nat. Hist. (4), X, 1872, p. 419 (type locality, Land of Grass, Mongolia; type in Brit. Mus.; Brenchley, collector); Brenchley's Cruise 'Curação,' 1873,p. 396, pl. xxii, fig. A.— Fraciu r. Jahrb. Hamburg Wiss. Anst., V, 1888, p. 46, pl. iv. fig. 9 (Tehikiang, Oldenburg Mus.).—Méhely, Zichy's Dritte Asiat. Forechunger, 11, 1901, p. 56 (Khalgan, Chinese Wall, 760 m. alt.; Nan-lou Pasa Podarces (Eremias) brenchleyi Strauch, in Przevalski's Mongoliya i Strana Tangutov, 111, 1876, p. 32 (Ordos; eastern Mongolia).

¹⁸⁸⁸ Econian argun 1 Ber., pp. Mus.

Thanks to the kindness of Mr. Witmer Stone, curator of the Phila delphia Academy Museum, I have been enabled to examine two specimens recorded by him from eastern Mongolia. One of them is a typical E. argus in every respect. The other has only a very small, single median fronto nasal and a pair of very long prefrontals. It consequently approaches E. arguta, though a close inspection seems to show that the prefrontals have become so long by fusion with a pair of fronto-nasals, the shield which now appears in that rôle being probably only the ordinary azygous interprefrontal pushed forward so as to touch the supranasals. In these specimens the light centers of the outer rows of ocelli are nearly confluent, so as to form longitudinal light lines.

Description. Adult female, U.S.N.M. No. 21182; Seoul, Korea; June, 1883; P. L. Jony, collector (figs. 217-219). Rostral pentagonal, in contact with first supralabials and supranasals, nostril a round hole between three bulging nasals, of which the supranasals are more than twice as large as the other two together and broadly in



Figs 217 210 Eremiam argus 2x nat size. 217 top of bead, 218 side of head, 210 femoral pobes and axal region. No 20152 U.S.N.M.

contact behind the rostral; postnasal small, in contact with interparietal and first loreal; subnasal long and narrow, in contact with first and second labials, first loreal, and the two other pasals; a pair of internasals behind the supramasals and smaller than the latter, a pair of pentagonal prefrontals separated by a small median azygous spear shaped prefrontal, the former in contact externally by second loreal and first supercibary; frontal long, slightly longer than its distance from rostral, twice as wide anteriorly as posteriorly, in contact posteriorly with the first supraocular; three supraoculars, the first two large, the third very small, separated from the superciliaries, the first by a single row and the second by a double row of granules, the space in front of first supraocular, between that, frontal, prefrontal, and first superchary filled with granules, the row nearest frontal and prefrontals being somewhat larger than the others; five superculiaries, the first longest and in contact with prefrontal; frontoparietals larger than second supraoculars, almost as long as parietals. in contact with third supraocular; parietals shorter than frontal, in contact behind interparietal, which is small, only, little larger than third supraocular; a long and narrow shield along the outer edge of each parietal; two loreals, the anterior rather small, triangular, and in contact with internasal; a long subocular in contact with four supralabials, not reaching the edge of the lip; nine supralabials, fifth longest, sixth directly under the subocular, smaller than seventh; over the seventh labial a large lower postocular; lower temporals large, smooth, upper ones granular, about ten granules and scales in a row between parietals and supralabials; six pairs of enlarged submandibulars, or chin-shields, third pair largest, sixth smallest, first three pairs in contact; upper surface covered with small, uniform granules, about 58 in a row across the middle of the back between the ventrals; gulars large flat granules followed by a few rows of smaller ones gradually merging into the flat scales of the lower neck; collar consisting of about nine large, smooth scales, of which the median one is the largest; fold behind collar covered with small granules; ventral plates subequal, twelve in a row across the abdomen, and not forming longitudinal series, smooth, about 30 shields in a row on the median line between collar fold and groin; anterior aspect of arm with large smooth scales, which on the forearm assume the shape of transverse plates; anterior aspect of femur and lower side of tibia with a series of broad transverse plates; scales on underside of digits sharply keeled; a large median preanal plate with a deep cleft behind; a series of 11 femoral pores on each side; tail covered with elongate, squarish, keeled scales arranged in verticels, about 24 in a verticel, a head length from the vent. Color (in alcohol) dull clay-colored above with about eight longitudinal rows of yellowish spots surrounded by a black ring on the back, these ocelli being continued on the base of the tail; underside whitish.

Dimensions.

	mm.
Total length	110
Snout to vent	
Vent to tip of tail	59
Snout to collar	17
Snout to ear-opening	12.5
Snout to posterior edge of parietals	11.5
Greatest width of head	8
Fore leg	18
Hind leg	26

Variation. The two other specimens (same locality and collector) before me are rather young. Both differ in having the paired prefrontals touch behind the azygous shield and in having a longer suture between the parietals behind the interparietal. No. 21183 lacks the posterior pair of submentals and in No. 21184 the lower nasal distinctly reaches the rostral; the former has about 65 granules and

plates around the middle of the body and 10 femoral pores, the latter 70 granules and plates around the body and 11 femoral pores on each leg.

Habitat. Owing to the doubt whether certain references to E. argus may not in reality belong to E. breuchleyi, it is at present impossible to define the habitats of these two forms exactly. The difficulty is increased by the fact that both seem to occur together, in some localities, at least.

As far as can be made out at present *E. argus* occurs in northeastern China; thus at Chefu, whence came the types; at Kiautshou and Tsingtau, recorded by Werner; and at Peking, from the neighborhood of which city Moellendorff, Steindachner, and Boettger, have recorded several specimens. Fischer, who also distinguishes between the two forms, mentions specimens of true *E. argus* from "eastern Mongolia." During Count Zichy's third Asiatic voyage it was collected in the same general region, viz, at Shara-murun, in eastern Mongolia, and farther east on the road to Peking between Daba and Khalgan.

It was first recorded from Korea by F. Mueller, who presented a specimen from Chemulpo to the Basel Museum, and four other specimens are in the St. Petersburg Museum from the same locality, collected by Bunge in 1889 and 1891. The late P. L. Jouy, during June and August, 1883, obtained three specimens at Seoul, which are now in the United States National Museum.

List of specimens of Eremias argus

U B. N.M. No	Sex and agr	Locality	When lock		By whom collected	Femoral pores
21183	Femiles	Scoul, Korea	June.	INKS	P. L. Jouv	- 1
21183	Young	do	Yag	1883	do	10
21184	do.a	do	do		do	11
	-	I boundary or 240 ferry 2	17 010		5 D 050	

Genus LACERTA Linnæus.

1758 Lacerta Linnaits, Syst. Nat., 10 ed., 1, p. 200 type, L. agilis., 12 ed., 1, 1766, p. 359.

1830 Zootoca Wacaen, Nat Syst Amph , p. 155 type, L. meipara,

1851 Atropis GLUECKSETTG Lotes 1851 p. 138) (same type

LACERTA VIVIPARA Jacquin.

1787. Lacerta ranpua Jacquis, Nova Acta Helvet, I. p. 33, pl. p. (type-localnty, Schnecherg, near Vienna, Austria) – Dobrotvorski, Izvest Sibirsk Otd Googi Obstch I, 1870 p. 23) southern Sakhalin) – Bedriaga, Abh Senekenberg Naturf, Ges., XIV, Pt. 2, 1886, p. 338, Padun Barkal Lake Sakhalin, —Bollenger, Cat. Liz. Brit. Mus., III, 1887, p. 5

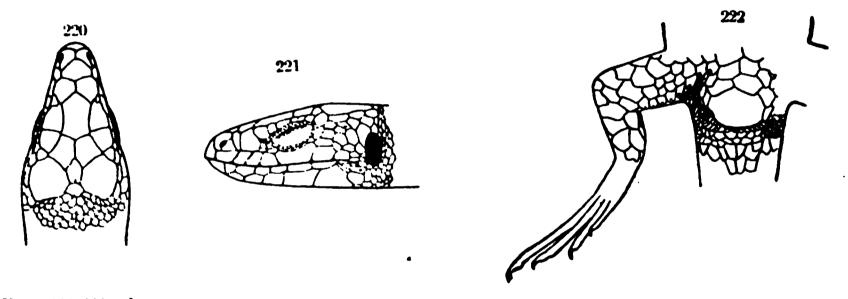
[@]Signifying lizard.

b Signifying bearing living young.

(Stanovoi Mts.; Niklayevsk, Amur; Sakhalin); Ann. Mag. Nat. Hist. (6), V, Feb., 1890, p. 138 (Amurland).—Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg, LX, Prilozh., No. 5, 1889, p. 291 (Sakhalin); Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, no. 1, 1905, p. 115 (Europ. and Asiat. Russia; Sakhalin).—Lacerta (Zootoca) vivipara Middendorff, Sibir. Reise, II, II, Pt. 1, 1853, p. 247 (Stanovoi Mts.; Aldan Riv.).—Zootoca vivipara Maack, Putesh. na Amur, 1859 (p. 152) (Amurland); Putesh. na Ussuri, 1861, (p. 189) (Ussuri Valley).

The numerous synonyms based upon European specimens are here omitted.

Description.—Adult female; U.S.N.M. No. 14385; Sakhalin Island; St. Petersburg Academy (figs. 220-222). Rostral pentagonal, not entering nostril, not in contact with internasal; nostril round, between two nasals; supranasals in contact behind rostral, also in contact with first supralabial, and anterior loreal; postnasal not in contact with second supralabial; anterior loreal high and narrow, in contact with supranasal, internasal, and prefrontal; posterior loreal twice as large as anterior; internasal much wider than long, not in contact with poste-



Figs. 220-222. Lacerta vivipara. 2×nat. size. 220, top of head; 221, side of head; 222, femoral pores and anal region. No. 14385, U.S.N.M.

rior loreal, prefrontals smaller than fronto-parietals, in contact with first and second supraoculars: frontal hexagonal, with parallel sides, slightly longer than its distance from rostral, and equaling the length of the parietals; four supraoculars, anterior and posterior very small, all in contact throughout with superciliaries; first supraocular in contact with posterior loreal, second with prefrontal, third with frontal, and fourth with fronto-parietal; four superciliaries on one side, six on the other; fronto-parietals larger than prefrontals; interparietal pentagonal, twice as large as posterior supraocular, broadly in contact behind with occipital, which is slightly larger than posterior supraocular, hexagonal, and slightly protruding behind parietals; parietals not in contact, their external edge bordered by three small scutes not specially differentiated from the temporals: seven supralabials on left side, six on right, fifth or fourth, respectively, longer and higher than the others directly under the eye; temporals large, flat irregularly polygonal scutes, about four in a row between orbit and ear-opening,

the one at the upper anterior edge of the latter (the so-called tympanic) larger than the others; six lower labials on left side, five on right; six pairs of submandibulars, or chin-shields, the last pair very small; first two pairs of chin-shields in contact throughout, third pair separated posteriorly by a wedge of gular scales, back covered with bluntly keeled, slightly imbricated scales, the length of six from the middle of the back corresponding to the length of four ventral plates, these dorsals becoming gradually smaller and nearly smooth on upper neck and sides, about 30 in a row across the middle of the back between the ventrals; gular scales smooth, irregularly polygonal with rounded corners, increasing in size backward toward the collar, which consists of 10 large, smooth shields; fold behind collar covered with granules and small scales; ventral plates in six longitudinal rows, the two median rows narrower and the next row on each wider than the outer series, which is bordered externally by a series of large flat scales only slightly smaller than the median series of plates; plates between the arms not in regular longitudinal rows, the series next to the collar fold being oblique, lengthened, more or less pointed behind; 29 transverse rows of plates between collar and preanal plate: preanal plate very large, smooth; arm with a series of large smooth plates above the elbow and two below; anterior and lower surface of femur and tibia also covered with large smooth plates; eight pores on right thigh, ten on left; scales covering underside of digits smooth; tip of longest toe reaching wrist of fore leg; tail covered with squarish, clongated scales, as long as the ventral plates, those on the upper surface keeled, those on the basal half of the lower surface smooth, Color (in alcohol) olive clay-color above with two dorsal series of small whitish dots, each about covering one scale, edged on each side by a dark brown dot of similar size; a lateral series is also indicated as well as a few brown dots on the middle portion of the back, these marks, rather better defined, continued on the tail; underside paler olive gray, posterior ventrals obscurely marked with blackish, fund legs and tail underneath more heavily marked with dusky

Domensoons	
	19(11)
Total length stail regenerated)	(96)
Shout to yent .	50
Snout to cellar	17
Shout to car-opening	10
Snort to posterior edge of a capital	-0
Greatest width of head	4
Fore leg	
Hind list	,

The adult male has relatively longer legs, especially hind legs, etail, the latter being nearly twice as long as the head and body it male, and only about one and a half times as long in the female

Variation.—The present species is not very variable as far as scutellation is concerned. Usually the fifth supralabial is the subocular; the number of scales on the collar varies between 6 and 10; there are sometimes 8 regular longitudinal series of ventrals; femoral pores vary between 7 and 13.

The coloration is much more variable, at least in European specimens. The underside of the male is in Europe usually more or less orange colored, and in moist localities and higher altitudes melanistic specimens are not uncommon.

The young, as a rule, are much darker than the adults, nearly black with yellowish dots.

Habitat.—This is one of the most widely distributed species of lizards, inasmuch as it occurs in Europe from the Pyrenees and the Alps to the Arctic Ocean in East Finmark, Norway, and from the Atlantic in the west to the Okhotsk Sea and the Sea of Japan in the east. It is recorded from Nikolayevsk on the Amur River, from the valley of the Ussuri, as well as from the island of Sakhalin. The U.S. National Museum possesses a specimen from the latter locality, thanks to the liberality of the St. Petersburg Academy of Sciences. Nikolski reports that he met it not infrequently in the middle part of Sakhalin, that Poljakof collected two specimens near the mouth of the river Tim, and that Dobrotvorski observed it in the southern part of the island. He also enumerates numerous specimens collected by Maack, von Schrenck, and others, among them a specimen from Decastries Bay collected by P. Semenow.

List of specimens of Lacerta vivipara.

U.S. N.M. No.	Sex.	Locality.	When col- lected. By whom collected or from whom received.	Femoral pores.
14385	Female a	Sakhalin Island	Acad. St. Petersburg	8-10

⁴ Description p. 252; figs. 220-222.

Suborder SERPENTES.

1758. Scrpentes Linnæus, Syst. Nat., 10 ed., I, p. 214.

1759. Scrpentia Linnæus, Syst. Nat., 11 ed., p. 76.

1802. Ophidia Macartney, in Ross' Transl. Cuvier's Lect. Comp. Anat., I, tab. III.

1803. Ophidii Daudin, Hist. Nat. Rept., V. tab. p. 8.

1826. Idiophides Ficinus and Carus, Uebers. Ges. Thierr., tab.

1828. Strepsichrotes Ritgen, Nova Acta Acad. Leop. Carol., XIV, p. 257.

1828. Ophes Wagler, Isis, 1828, p. 860.

1839. Ophides Swainson, Nat. Hist. Class. Fish. Amph. Rept., II (Lardner's Cab. Encycl.), p. 134.

1849. Pleuropoda MAYER, Rheinlaend. und Westphal. Verhandl., VI (p. 177).

The characters separating the snakes from the lizards have been pointed out under the head of the latter, and it is only necessary here to recall the fact that all the reptiles occurring within the boundaries of this work, which have no external limbs are snakes. In southern China, ranging west to the Himalayas, there occurs a genus of legless lizards, Ophisaurus, of the family Anguida, but the species have an external ear-opening which at once distinguishes them from the snakes.

Several families of snakes are not represented in the fauna here treated of. The most important of these is that of the Boids, which contains the largest snakes, the boas and the pythons, a the most remarkable external character of which is the rudiment of posterior limbs in the shape of a small claw-like spur on each side near the vent. They are found chiefly in the tropical regions of both the Old and the New World. The Anilinda, a small family with one representative in America and less than half a dozen species in southeastern Asia, have also rudiments of hind legs. The Leptotyphlopida, which have a very great external resemblance to the Typhlopida, but with teeth only in the lower jaw, are confined to America and Africa, a few species only entering Asia in the southwestern part. The Uropeltide and Xenopeltide are two small families, the former occupying Ceylon and the mountains of southern India, the latter consisting of a single species inhabiting the Malayan Archipelago and peninsula as well as the adjacent portions of the mainland. Finally, the family Amblycephalidæ is a very interesting one, because of certain wellmarked characters in the anatomy of the skull, together with the absence of the groove under the chin, so characteristic of the bulk of the snakes which the Amblycephalidz resemble in most other external characters. The members of this family belong mostly to Central and South America, but two genera inhabit southeastern Asia, from the Himalayas to Hongkong south to the Malayan Archipelago and the Philippines.

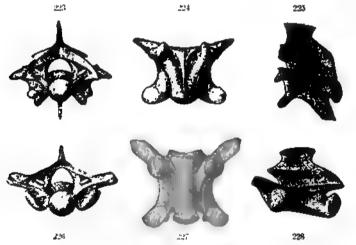
The following table of the superfamilies, families, and subfamilies of snakes ascertained to occur within our limits gives the essential characters by which these divisions have been separated. There is still considerable divergence in the opinions of authors concerning the relative value of some of these divisions, but in breaking up of the aglyph and opistoglyph 'series' I believe that a better recognition of the true relationships of their component parts can be obtained.

O Pythine molarox is sometimes included in the faunt of Formosa, on the strength of a specimen (skin, sent by Swinhoe). Doctor Grenther, Rept. Brit. India, p. 331 however, states that according to a communication from Swinhoe himself, the specimen had been imported into Formosa from China.

SYNOPSIS OF SUPERFAMILIES, FAMILIES, AND SUBPAMILIES.

ار	в «Туановонь в — У	in as toniteryonal	transpalatines; teeth in upper jaw only.	
"		co e e trafato i à Manei		
			Typhlopid.e., p. :	209,
æ	ë An ectopterygoid ∢ra			
	b1 (Natricoide &)	Maxillary bone b	orizontal	
	 c¹ None of the ante- 	rior maxillary tes	eth grooved or perforated. NATRICIDE, p.:	262.
	d Hypapophyses	present through	out the vertebral column (figs. 223-225).	
	ϵ^{μ} All maxillary	y teeth solid	NATRICINE, p.:	263.
	e Posterior ma	xillary teeth groo	vel	290
			ror dorsal vertebræ (figs. 226–228).	
	ϵ^{t} All maxillar	y teeth solid .		306.
	€ Posterior in:	exillary teeth gr	movedBorgin &, p.:	181.
	c ² Anterior maxillar	ry teeth grooved.	or perforatedELAPID.E. p.3	jii.
			ELAPINE, p. 5	
			Hydrin.g. p. 3	
	В (Crotytome ъ). М	axillary bone ver	rival	
	c ¹ No loreal pit			142.
			CROTALIDÆ, p.	
	cm1 1			

The above synopsis is chiefly based upon characters which either require more or less dissection or examination of the posterior maxil-



Figs, 223-225. Postferor dorsal vertegra of snakes, 225 back view, 225, lower view, 225, side view of vertegra with dypapophysis, 225, back view; 227, lower view; 228, side view of vertegra without hypapophysis (copied from Boulenger, Cat. Snakes Brit. Mus., I 1893, p. 171...

lary teeth. The latter often presents difficulties, and while in some cases it must be resorted to in order to obtain absolutely reliable identification, a handy artificial key to the genera of snakes occurring within our territory may be useful in determining the greater majority of specimens.

ARTIFICIAL KEY TO THE GENERA OF SNAKES OCCURRING IN JAPAN AND ADJACENT TERRITORY.

(In two instances reference is only had to the family or subfamily names, in which	ı
cases the genera may be found in the key or synopsis on the page quoted.)	
a ¹ Tail laterally compressed	
a ² Tail cylindric.	
b1 Body covered with nearly uniform cycloid scales, above and below,	
Typhlops, p. 260.	
b^2 Body covered above with scales, below with transverse plates.	
c1 A deep hole or pit between nostril and eye	
c^2 No hole between nostril and eye.	•
d Snout covered with small scales	
· d ² Snout covered with regular shields.	
e^1 No internasal shields	
e^2 Internasal shield or shields present.	
f ¹ Parietals broken up into minor shields	
f^2 Parietals normal.	
g^1 A single internasal shield	
g^2 Two or more internasal shields.	
h^1 No postocular shield, temporals joining eye	
h^2 One or more postocular shields separating temporals from eye.	
i ¹ Subcaudals undivided	
j^1 Scale rows 13	
j^2 More than 13 scale rows. (Hemibungarus, p. 387.	
k^1 Neck dilatable; more scale rows around neck than around	ı
middle of body	
k^2 Neck not dilatable; scale rows around neck not more numer-	
ous than around middle of body.	
l ¹ Vertebral scale row enlarged	
l^2 Vertebral scale row not enlarged.	
m¹ Pupil vertically elliptic.	
n^1 Nostril in a single nasal; three pairs of chin-shields,	
Psammodynastes, p. 383.	
n ² Nostril between two scales; two pairs of chin-shields,	
Dinodon, p. 356.	
m^2 . Pupil round.	
n^1 More than one loreal	
n^2 Not more than one loreal.	
o ¹ Portion of rostral visible from above as great as its	l
distance from frontal	
o ² Portion of rostral visible from above less than its dis-	
tance from frontal.	
p^1 Posterior chin-shields considerably longer than	
anterior	
p^2 Posterior chin-shields equal to or shorter than	
anterior.	
q ¹ No scale pores	
q^2 Scale pores present.	
r^1 Tail more than one-fourth of total length,	
Zamenis, p. 349.	
r^2 Tail less than one-fourth of total length,	
Elaphe, p. 307.	
26485—No 58—07——17	

This key is not satisfactory for the determination of the last four genera, and great care should be exercised in their identification. Specimens referred to any of these should be tested by the other keys and by comparison with the descriptions. There is no reliable external character by which to distinguish our species belonging to Natrix from those of Elaphe. However, a specimen with smooth or nearly smooth scales (with pores) is usually an Elaphe, and when more strongly keeled, if it has a small scale below the preocular (a subpreocular), it also belongs to the latter. Natrix never has this subpreocular. Zamenis has it, but can be recognized by the very long and narrow shields on top of the head.

The land snakes occurring in the four large islands of Japan can be easily determined by the following artificial key:

ARTIFICIAL KEY FOR THE IDENTIFICATION OF THE SNAKES OF JAPAN PROPER.

- - b^1 Subcaudals entire; no postoculars, temporals joining eye.

Achalinus spinalis, p. 297.

- b^2 Subcaudals in pairs; postoculars, separating temporals from eye.
 - c1 Pupil vertically elliptic.
 - c² Pupil round.
 - d¹ Scale rows 19.
 - e^1 Ventrals less than 170.
 - f^1 Parietals equaling the distance from eye to tip of snout.

Natrix tigrina, p. 272.

 f^2 Parietals longer than distance from eye to tip of snout.

Natrix vibakari, p. 266.

- d^2 Scale rows more than 19.

The examination of the dentition must be made very carefully in order to avoid mistakes. The safest way is probably to dissect out one of the maxillary bones. This can be done very easily by running the point of a sharp knife between the supralabials and the underlying bone, cutting the tissue along the whole length of the latter. By forcing the point of the knife over the upper edge of the bone in the region of the eye the bone can be easily lifted up and the connecting ligaments severed. The adherent tissue may be carefully removed, though in most cases it is sufficient to let it dry. The teeth can now be examined conveniently. Care must be had not to mistake the space left by a lost tooth for a natural interval; if a tooth has fallen out, a distinct pit or depression is left on the alveolar edge of the max-

illa. In counting the teeth the second inner row of loose teeth which are only the reserve teeth must not be taken into consideration. If the specimen is so hardened that it is difficult to open the mouth it should not be forced open by prying, a procedure apt to ruin the teeth and break the lower jaw, but the thick muscle at the corner of the mouth closing the jaws should be cut through on both sides. If properly done the specimen need show no outward sign of mutilation. The maxilla after being dissected out and cleaned should be placed in a small glass tube or vial and, provided with the same number as the snake, kept in the same bottle, or separately together with other preparations of the same kind.

The apical scale pits are usually distinctly visible under a fairly good magnifying glass. In some cases, however, they are rather difficult to discern, thus, for instance, in *Elaphe rufodorsata*. When the pits are not discovered at once the skin should be allowed to dry and then viewed at different angles to the light. The epidermis of



Figs. 239-231 Head-shields of typhlops of frontal, opentherarietal I, supralabials; n, washi, o ocular, o farietals, po fresental, poo freecular, poo fostocular, o rostral, so, supracular.

scales of different parts of the body should be examined. In very doubtful cases it may even become necessary to remove some of the epidermis and examine it under a more powerful lens.^a

Family TYPHLOPID.E.

The blind-snakes are small cylindric snakes of even thickness, head and tail not distinct, the latter extremely short and terminating suddenly. The body is covered with smooth scales somewhat resembling fish scales, above and below, and the eye is only dimly visible under the semitransparent head shields. They are very worm-like in appearance and burrow in the ground.

The family is distributed over the warmer portions of both hemispheres. Only one genus is represented in our territory.

⁹ For the nomenclature of head shields of Typhlopid snakes, see figs 229-231 on the present page, and for that of the Natricid snakes, figs 236-238, on page 262

Genus TYPHLOPS a Oppel.

- 1811. Typhlops Oppel, Ordn. Rept., p. 54 (type, T. lumbricalis).
- 1843. Aspidorhynchus FITZINGER, Syst. Rept., p. 24 (type, Typhlops eschrichtii Schlegel).
- 1843. Pseudotyphlops Fitzinger, Syst. Rept., p. 24 (type, Typhlops polygrammicus Schlegel).
- 1843. Ramphotyphlops FITZINGER, Syst. Rept., p. 24 (type, Typhlops multilineatus Schlegel)
- 1844. Ophthalmidium Duméril and Bibron, Erpét. Gén., VI, p. 262 (type, O. longissimum).
- 1844. Onychocephalus Duméril and Bibron, Erpét. Gén., VI, p. 272 (type, O. delalandii).
- 1845. Argyrophis Gray, Cat. Liz. Brit. Mus., p. 136 (type, A. bicolor).
- 1845. Anilios Gray, Cat. Liz. Brit. Mus., p. 135 (type, A. australis) (not Anilius Oken, 1816).
- 1845. Meditoria Gray, Cat. Liz. Brit. Mus., p. 139 (type, Typhlops nasutus).
- 1845. Onychophis GRAY, Cat. Liz. Brit. Mus., p. 132 (type, O. franklinii).

The genus Typhlops, of which only one species of wide distribution enters our territorial limits in the extreme south, is a large one widely distributed over the tropical and subtropical countries of both the eastern and the western hemisphere. Only a few species, however, occur in America.

TYPHLOPS BRAMINUS b (Daudin).

AMAGAKU OR MEKU HABU.

- 1803. Eryx braminus Daudin, Hist. Nat. Rept., VII, p. 279 (based on Russell's Ind. Serp., I, pl. xliii; type-locality, Vizagapatam, India).—Typhlops braminus Cuvier, Règne Anim., 2 ed., II, 1829 (p. 73).—Jan, Icon. Ophid. (p. 12), livr. 3, 1864, pls. iv and v, fig. 16 c (East Indies).—Boulenger, Cat. Sn. Brit. Mus., I, 1893, p. 16 (South Asia; Indian Ocean islands; Africa S. of equator).—Wall, Proc. Zool. Soc. London, 1903, p. 85 (Formosa; Hongkong).
- 1820. Tortrix russelii Merrem, Tent. Syst. Amph., p. 84 (based on Russell).
- 1845. Argyrophis truncatus Gray, Cat. Liz. Brit. Mus., p. 138 (type-locality, Philippines; types in Brit. Mus.; Cuming, collector).
- 1845. Argyrophis bramicus Gray, Cat. Liz. Brit. Mus., p. 138 (lapsus for braminus).
- 1845. Onychocephalus capensis Smith, Illus., Zool. S. Afr., Rep. (pl. Li, fig. 3; pl. Liv, figs. 9-16) (type-locality, Cape of Good Hope; types in Brit. Mus.).
- 1860. ? Ophthalmidium tenue Hallowell, Proc. Phila. Acad., 1860, p. 497 (typelocality, Hongkong, China).
- 1863. Typhlops inconspicuus Jan. Elenco Sist. Ofid., p. 11 (nomen nudum; Madagascar).
- 1882. Typhlops (Typhlops) cuproctus Boettger, Zool. Anz., 1882, p. 479 (typelocality, Nossi-Bé; type in Mus. Senckenberg.; A. Stumpff, collector).
- 1891. ? Typhlops sp. Okada, Cat. Vert. Japan, p. 68 (Miyakoshima).

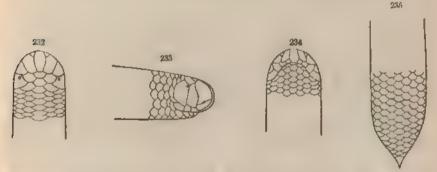
Description (figs. 232-235).—Science College Museum, Tokyo; Okinawa shima, Riukiu; Nishi, collector. Snout rounded, moder-

a From τυφλός, blind; ώψ, eye.

b Signifying Brahmin, a Hindu priest.

c See this work, figs. 232–235.

ately projecting; nostrils lateral, the nasal cleft proceeding from the preocular, preocular as large as ocular, in contact with second and third supralabials and with anterior (lower nasal); rostral very narrow, scarcely one-third the width of the head, in contact with prefrontal, not extending as far back as the eyes, anterior nasal extends to the upper surface of the head; posterior (upper) nasals separated by the prefrontal; prefrontal about same size as supraoculars, slightly larger than frontal, all considerably larger than the body scales; 4 supralabials; eyes distinct; 20 scales round the body; tail ending in a spine and shorter than greatest diameter of body which is contained 38 times in total length. Color (m alcohol) dark brown



Figs 232-235. Typhlops braminus. Enlarged, 232, for of head, 233 side of head, 234 underside of head, 235 tail. From Jan, Icon Ophid, Liv 3 pl. v, Fig. 16.

above, each scale being brown with a pale base; snout and tail whitish; lower surface paler, the base of the scales being dark, the terminal two-thirds pale brown.

		Dimera	8150318				
							ाम रम
Total length .							152
Snout to vent .							149
Vent to tip of tail							3
Greetest diameter of	Charle						.1

Habitat. A species of very wide distribution in the tropics of the Old World, rivaling some of the geckos. It is found from South Africa and Madagascar through India and the Malayan archipelago to South China, the Philippines, and Guam^a, extending as far north as Okinawa.

There are specimens from Formosa in the British Museum collected by Swinhoe and Dickson, and in 1894 the museum in Christiania received a number of specimens collected by Mr. Novara in the same island, one of which is now in the United States National Museum.

^a Originally found there by Quoy and Guaymard (Duméril and Bibron, Erpét Gén., VI p. 312). Dr. J. C. Thompson, U. S. N., recently captured a specimen on thusland according to letter of September 17, 1906.

I have examined three specimens from the Riu Kius in the museums in Tokyo, viz, two in the Science College Museum, from Okinawa shima, and one in the Imperial Museum, Ueno Park, from Yaeyama Island, southern group. There is also a specimen in the Hamburg Museum (No. 1479) collected by Doctor Warburg in the "Liukius."

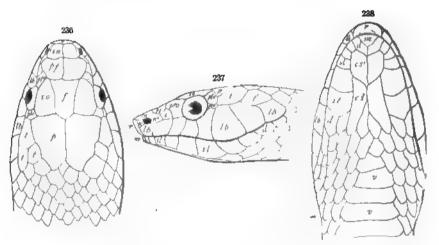
T date	.6		~ €	Tunklana	harmin
LASE	OI.	# Decimens	OI	1 Aburtobs	braminus.

Museum.	No. Sex and age	toculity.	When col- lected.	By whom collected.	Total length. Length of tail.	Disneter.
U.S N M Sel Coll , Tokyo Do . Imp. Nut , Tokyo	do.g., Young	Formosa Okuwa shima do Miyakoshima .	- - -	Mr Novara	mm mm 147 3 152 3 76 2 8i 2	3 4 2 2.5

Description, p. 260.

Family NATRICIDÆ.

This family embraces the great bulk of snakes, in fact only somewhat less than two-thirds of all the species of snakes known.



Figs. 23:-23: - Head-shields of a natricid snake—cs!, anterior chin shields, cs?, posterior chin-shields, f, frontal, il., lower labbles in, internanals, f loreal, ib superlabbles; m, mental, nl, anterior nasal; nl, posterior nasal, p, parietal, pf, frefrontals, pto, pre-ocular, pto, postocular, t, rostral, to, superchular, t, temporals, t, ventrals.

In this vast horde of species, considerably over one thousand, there is a great uniformity of structure, making it difficult to formulate easily recognizable groups. Our knowledge of the phylogenetic relationships of the various forms has been established only recently, thanks

to the studies of Cope and Boulenger, though much is to be learned yet before a natural classification can be expected.

This family is usually known as the Colubrida, but, as will be shown further on, the generic name Coluber belongs to the typical genus of

the so-called Viperidæ.

The distinctive characters of the four subfamilies recognized among the natricid snakes occurring in Japan and adjacent territory have been tabulated as follows:

at Hypapophyses present throughout the vertebral column (figs, 223-225). NATRICINE, p. 263. b1 All maxillary teeth solid a² Hypapophyses absent in posterior dorsal vertebrae (figs. 226–228). b2 Posterior maxillary teeth grooved.. . . . Вотых в р 381.

Boulenger has shown that the question whether the hemal proc-. esses are present on the posterior vertebræ or not can be easily ascertained by making an incision along the belly in the posterior fifth of the body, pushing aside the viscera, and disarticulating the backbone by bending the body dorsally. The two styles of vertebras, with or without the lower median process, are shown in the accompanying figures. It should be remarked, however, that recently considerable doubt has been thrown on this character as to whether it is of the fundamental importance usually attributed to it, or not.

Subfamily NATRICINÆ.

The Natricinæ are without grooved teeth in the posterior part of. the upper jaw.

Our species, although sometimes with the nostrils placed rather high, never have them on top of the snout, and the internasal shields, though often small and narrowed anteriorly, are in pairs and join the rostral. The scales are strongly keeled.

Only two genera are known from our territory, which may be distinguished as follows:

a! Subcaudals divided, postoculars well developed, separating temporals from orbit Natrus p 263 a' Subcaudals single, postorulars rudimentary, the temporals apparently entering the Achalinus p 294.

Genus NATRIX " Laurenti.

- 1768 Natrix Laurenti Syn Rept p 73 (type A infgaris Coluber natria).
- 1822 Tropenotas Kuhl Isis 1822, p. 473 enomen nudam
- 1826 Tropodonote s II Rote, Isis, 1826, p. 205, type, T. natro-
- 1843 Rhahdophis Ettzinger Syst Rept., p. 27 (type, T. subminiatus Schlegel). 1843 Stenophis Ettzinger Syst Rept., p. 27 (type T. chrysargus Kuhl
- 1852 Hydrophotophic Sensitor Abb Nature Ver Hamburg II, Pt 2 esubstitute for Tropidonotas

- 1853. Nerodia Baird and Girard, Serp. N. Am., p. 38 (type, N. sipedon).
- 1853. Regina Baird and Girard, Serp. N. Am., p. 45 (type, R. leberis).
- 1854. Amphiesma Duméril and Bibron, Erpét. Gén., VII, p. 724 (type, A. stolatum).
- 1886. Bothrodytes ('OPE, Proc. Amer. Philos. Soc., XXIII, 1886 (p. 495) (type, Amphiesma subminiatum).
- 1893. Ceratophallus Cope, Amer. Natural., XXVII, May, 1893, p. 483 (type, Natrix vittata).
- 1893. Diplophallus Cope, Amer. Natural., XXVII, May, 1893, p. 483 (type, N. piscator).

This genus is quite commonly known as *Tropidonotus* Kuhl, but the above synonymy shows how poor the status of that name is. *Natrix* was established by Laurenti as early as 1768, and no difficulty is encountered as to the type, since Fleming, in 1822, before the name *Tropidonotus* was invented, designated *N. torquatus* (*Coluber natrix* Linnæus, or *Natrix vulgaris* Laurenti) specifically as the type.

The genus *Natrix*, as here understood, has been variously subdivided into genera based upon the syncranterian or diacranterian character of the dentition, the presence, or absence of scale pores, and, lately, upon the structure of the intromittent organ, whether simple or bifurcate, and whether provided with a papilla at the apex or not. These structural characters are only known in a few of the numerous species contained in the present genus, and any rational attempt at subdivision must be postponed until they are investigated in all the species.

That the dentition in itself alone is not a satisfactory guide to the proper segregation of the species into natural groups is shown by Natrix vibakari. By Boulenger this species is retained in the first section of the genus, which he restricts as Tropidonotus proper, because having the hinder maxillary teeth "gradually enlarged," against the section Amphiesma having the "last two or three abruptly enlarged." I have dissected out the maxilla of three specimens of this species and would designate the last two teeth as "abruptly enlarged" in every case. It is therefore impracticable to base a primary subdivision of the group upon this character.

On the other hand, the scale pores have only been recorded in the case of very few species. Thus I can find no record as to whether *Natrix swinhonis* possesses them or not, and inclined as I am to regard this character as indicating natural genera among these snakes, I am unable to employ it at present.

This leads to an inquiry into the closer relationship of the Japanese species of this complex genus. As will be shown further on, Natrix tigrinus is only subspecifically distinct from the mainland form N. Interalis, which extends westward to the confines of Tibet. Natrix to another group of species which also extend astern Himalayas. It is not difficult to point

from Assam, and Natrix craspedogaster, from

the province of Fokien, opposite Formosa, as the nearest relatives known. Bearing in mind that the relative size of the posterior maxillary teeth is of little practical importance. I think we may also safely add to this group Natrix chrysarga, a species which extends from the eastern Himalayas to southern China, the Indo-China pennsula, and the Malay Archipelago. As will be shown further on, Natrix pryeri is a specialized member of this group. From what we now know of the distribution and relationship of the other reptiles in these regions, it is pretty safe to predict that a Natrix of the same group, either N. craspedogaster, or N. chrysarga, or a form intermediate between one of these and N. pryeri, will be found to occur in Formosa when the herpetological fauna of this island shall have become thoroughly known.^a

The other species enter our territory only in Formosa and as such their Himalayo-Chinese relationships are easily traced. Both N. stolata and N. piscator occur from the Himalayas and India to southern China, Indo-China, and the Malayan Islands N. annularis also inhabits the Yangtse drainage and N. swinhonis has its nearest relative, N. nuchalis, located on the upper Yangtse Kiang.

KEY TO THE JAPANESE, KOREAN, AND FORMOSAN SPECIES OF NATRIX.

at Scale rows, 19, supralabuals, 7, 8 or 9

bt Subcaudals less than 105 pairs

- c) Suture between rostral and internasal not shorter than between rostral and first supralabial (fig. 241).
 - di Parietals longer than distance from eye to tip of shout .. V ribakuri p 266.
 - d Parietals equaling the distance from eye to tip of shout
 - et Ventrals plus subcaudals more than 226, subcaudals more than 65.

V tugerna v. 272.

e² Ventrals plus subcaudals less than 226; subcandals less than 65.

N togrina lateralis, p 278.

"NATRIX CHRYSARGA . Schlegel .

1837. Tropidonotus chrysarqos Schlegel. Phys Scrp. II. p. 312 type-locality, Java, types in Leiden Mus., Kubl and Reinwardt collectors:

1847. Tropidonolus junceus (anton (at Mal Rept op 93 type locality, Pinang; type in Brit. Mus., Cantor collector)

1868 Amphresma platyceps Jan, Icon Ophid, hvr 29 pl 11, fig 1 (type-locality, Sikkiia) type in Milano Mus i not Tropidonotas platyceps Blvth 1854).

Scale rows, 19, all strongly keeled, 9 or 8 supralabilis, 50,93 pairs of subcaudals, suture between rostral and internasal not shorter than between rostral and first supralabilit, parietal longer than distance from eye to tip of shout. 2 anterior temporals,

NATRIX CRASPEDOGASTER Boulenger

1899. Tropidonotus craspedogaster Bot tenger Proc Zool Soc. London, 1899, p. 163, pl xvn (g l type-locality, Kuatian prov Fokien China, types in Brit Mus., La Teuche, collecter.)

Scale rows 19, outer faintly keeled 5 supralabilities 87 97 pairs of subcaudals; anterior temporals I or 2 from original description

- c^2 Suture between rostral and internasal considerably shorter than between rostral and first supralabial (fig. 255
 - d1 One outer scale row smooth, or none.
 - e Second row of temporals consisting of 1 or 2 scales 3 supralabials entering eye N stolata, p 280

NATRIX VIBAKARI a (Boie).

HIRAKARI.

1826. Tropidovotus vibakari Boie Isis 1826, p. 207 type locality, Japan Blomhoff, collector); Bijdr. Natuurk. Wetensch., II, Pt. 1, 1827, p. 254.—
Tramingk and Schleger, Fauna Jap., Rept., 1837, p. 87, Ophid., pl. v. (Japan, Decima) Schleger, Phys Serp II, 1837, p. 316 Dumeni, and Bibron, Erplt Gén., VII, Pt. 1, 1854, p. 595 Japan) Bibrer, Natuurk. Tijdschr Nederland Indic, XVI, 1858, p. 204 (Japan — Martens, Preuss Exped. Ost-Asien, Zool., I, 1866, p. 111 Yokohama, 1876, p. 379 — Stratch, Mém Acad Sci St Pétersb. (7), XXI, No. 4, 1873, pp. 174, 277 (Possiet Bay Baranovski Post, Suifun River, Amurland) Botlenger, Ann. Mag. Nat. Hist. 6), V. Feb. 1890, p. 139. Khabarovka, Ussuri), Cat. Snakes Brit. Mus. I., 1893, p. 221 (Ussuri Yokohama, Kobe, Formosa). Boettger, Kat. Schl. Mus. Senckenberg., 1898, p. 21 (Hondo Wall, Proc. Zool. Soc. London, 1903, p. 99 (Nagasaki, Mi. Fuji., 1905, II, p. 513 (Hondo) — Nikolski Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, No. 1, 1905, p. 214 (Possiet Bay).

1827 Tropidonotus vibikuri F Boie, Isis, 1827, p. 535 cerr typi.

1876 Tropidonotus martensa Hitchendorf, Mitth Deutsch, Ges. Ost Asiens, I., heft 10, pp. 30, 31 (substitute name) (Yokohama); Sitz Ber. Ges. Naturf. Fr. Berlin, 1880, p. 115.—Fertze, Mitth. Deutsch. Ges. Ost-Asiens, V. 1891, p. 239 not in Yezo.

Doctor Hilgendort changed the well-known specific name of this species into T. martensii because the name Hibakari by its significance, as indicating a deadly snake, is undesirable. This change, of course, is wholly inadmissible under all recognized nomenclatural codes. The principle involved would cause endless confusion and set the law of priority at naught.

Description. Adult male; U.S.N.M. No. 23335; Yokohama; September, 1896; L. Stejneger, collector (figs. 239-241). Rostral much broader than high, just visible from above, internasals rather large, truncate anteriorly, their suture with the rostral longer than half their width and longer than suture between rostral and first supralabial; prefrontals considerably larger than internasals, broadly in contact with supraoeular; frontal slightly longer than its distance

[&]quot;Whakara, or more correctly hibakara, is the name given by the Japanese to this snake, under the impression that it is so poise noise that its victim will live only through the day. Needless to say, it is perfectly harmless

from tip of snout, nearly equaling the interparietal suture; parietals as long as frontal and prefrontals together, much longer than distance from eye to tip of snout; nostril lateral, between two subequal nasals; loreal somewhat longer than high, its upper edge much shorter than the lower; one preocular, widely separated from frontal; three postoculars: temporals 1 + 2 (normal) on right side, the two of the second row being fused on the left side; 7 supralabials, third and fourth entering eye, sixth largest (normal), on right side, 8 on left side, an additional labial being interpolated in front of the eve; 4 lower labials in contact with anterior chin-shields, which are shorter than the posterior; 19 rows of scales, outer row smooth, the others distinctly keeled, with obscure apical pits best observable on the lateral scales; 146 ventrals; anal divided; 73 pairs of subcaudals. Color (in alcohol) uniform smoke-gray above, top of head darker, also darker along the middle of the back; upper lip whitish, the labials posteriorly edged with blackish; a black postocular band descend-



Figs 230-241 Natrix vibarari 2 x nat size. 239, for of head, 240, side of head, (3) \times nat size) 241, rostbal from front No. 23335, U.S.N.M.

ing on the upper half of the penultimate supralabial and crossing obliquely the suture between it and the last supralabial to the angle of the mouth, cutting off the latter labial from the others and associating it with a whitish postoral band which curves slightly upward from it toward the nape without crossing it: a few blackish spots along the edges of the postoral band; on the middle line of the nape, from the parietal suture a short distance backward a narrow whitish dark-edged line; two pale dots on the parietals near the middle of the interparietal suture; underside uniform whitish, with a series of small dusky spots—or rather, dashes—one near the outer end of each ventral and subcaudal.

Dimensiona		
		772 776
Total length	 	426
Shout to vent		308
Vent to tip of tail	 	118

This is a small snake, which probably seldom exceeds 600 mm. in total length.

Life colors, according to Dr. H. M. Smith, "light brown above; belly cream color."

The young, as shown by a specimen in our collection from Shikoku (U.S.N.M. No. 31850) only 155 mm, in total length, is essentially as the adult; the ground color, however, is darker and there are two distinct series of numerous roundish, pale, dark-edged dots, located on the fifth and sixth scale-rows on each side.

Variation A noteworthy variation in this species is the occasional joining of the parietal to one of the supralabials, noteworthy particularly because it was the condition found in Boie's type. In two of our specimens (No. 30730, from Kiusiu, and No. 34028, from Mount Fuji the contact is between the parietal and the sixth supralabial behind the first temporal, and in another specimen (No. 34029) there is such a contact on one side. The number of preoculars varies to some extent, but one is the normal number, not a single specimen of the 22 before me having more. Strauch, on the other hand, found two out of four specimens Altogether, his series was extraordinarily variable, as their postoculars varied between two, three, and two and three, while the supralabials showed the unusual variation of coalescing to the extent of being reduced to six, or even five. We have 12 with three postoculars, 4 with two and 3, and 3 with two. while all have 7 supralabials except three, which have 8 on one side. and one (No. 34034a) which has 8 on both sides. This additional labial is interpolated in front of the eye, and in one of the specimens the interpolation occurs on both sides, but the normal number of 7 is restored on one side by the coalescing of two labials behind the eye."

Remarks.—The relationship of this species to Natrix khasiensis, from Assam, and N. craspedogaster, from Fokien, has been alluded to above (p. 264)—It is not only shown in the unmistakable pattern of the upper lip and its continuation in the nuchal crescent, but also in the postparietal median light streak and in the series of white spots on the body of N. craspedogaster and the young N. ribakari described above (p. 268).—About the relationships with N. pryeri, see under the latter species (p. 286).

Habitat. -Common thoughout Japan from Kiusiu to Yezo. Doctor Nozawa has informed me that it occurs in the latter island, but he has sent no specimen as yet. Numerous specimens from the neighborhood of Tokyo, Yokohama, and Nagasaki are in the various museums, as well as some from Kobe, Miyazaki, and other places.

Outside of Japan it has been found in the Russian Coast Province from Possiet Bay, on the Korean frontier (Mus. St. Petersburg), to Vladivostok (Hamburg Mus. No. 2170) and Khabarovka, at the junction of the Ussuri with the Amur (Brit. Mus.)—In 1885 Jouy

[&]quot;For farther variations see Wall, Proc. Zool. Soc. London, 1905, 11, p. 513

obtained a specimen at Fusan, southern extremity of Korea (U. S. Nat. Mus. No. 17510), the first record from that country.

A specimen in British Museum is said to have been collected by Swinhoe in Formosa. It has the extraordinary low number of 127 ventrals, and altogether either its identity or its locality seeems open to doubt.^a

It has not been recorded from the Riu Kius.

^a See also Wall, Proc. Zool. Soc. London, 1905, II, p. 513.

List of specimens of Natrix ribakari.

	No.	age.	Locality.	When colliferted.	By whom collected or from whom received.	Scale rows.	Ven- trals.	Anal.	Sub- caudals.	Ocu- lara.	Tem porals.	Supra- labials.
	,									,		
	11327	Female	ларап	1878	E. S. Morse	61	**	7	71	1,3	1+1	-
Do	11328	Male	do.	1878	do	19	151	8	ಜ	1,2-3	1+2	2
Do	11329	do	do		do	19	146	7	2	1,3	1+1-2	~
Do	11330	Young	do.	1878	do	19	147	7	E	1,3	1+2	_
Do	11331	Female	op.	1878	do	19	146	2	8	1,3	1+1	l-
Do	. 17510	do	Fusan, Korea	1885	P. L. Jouy	19	148	2	88	1,2	1+1	i~
Do	23335	Male a	Yokohama	Sept. –, 1896	L. Stejneger	19	146	7	E	1,3	1+1-2	2-8
Do	30730	Female	Miyazaki, Kiusiu		C. A. Clark	19	146	7	72	1,3	1+2	7
Do	31850	Young	Suzaki, Tosa, Shikoku	May 8, 1903	Dr. H. M. Smith	19	148	2	g	1,3	2+2	
Do	31858	Male	Kochi, Shikoku	May 11, 1903	do	10	147	-2	88	1,3	1+2	2-8
Do	31859	Young	do.	do	do	19	141	7	74	. 1,3	1+2	_
Do	34028	Fernale	Mount Fuji	Aug. —, 1898	A. Owston	19	147	2	74	1,2-3	1+2	7
Do	34029	do	do	do	do	19	149	2	7.4	1,3	1+1	2-8
Do	34030	do	do	do	do	19	150	7	75	1,3	1+2	1-
Do	34031	do	do	do	do	19	145	7		1,2-3	1+2	7
Do	34032	Male	do	do	do	19	148	7	79	1,2	1+1	7
Do	34033	do	do	op	do	19	147	2	88	1,2-3	1+2	1
\mathbf{D}_0	34034	34034 Young	do	do	do	19	145	2	78	1,3	1+1	7
Do	34034a	do	do	op	do	19	145	63	78	1,3	1-2+1-2	00
Do	36543	Female b	Tokyo		. Sci. Coll. Tokyo	19	147	2	:	1,3	1+2	2
Do	38544	Male b	do		do	19	151	2	8	1,2	1+2	2-8
D_0	36545	do.b	do		do	19	150	61	74	1,3	1+1	t•
Do	36546	Young h	op.		do						•	•
Brit. Mus	ن	do. c.	Јирап		A. Adams	19	137	7	62			•
Do	p	do.c	do		do	19	137	2	8		•	
D_0	•	Male c	do		Museum, Leiden	19	148	2	72			•
Do	•	Female c	op	•	do	19	14	8	79			
Do	Ų	Male c	do		Doctor Bleeker	19	148	7		•	•	
Do	•••	Female c	Yokohama		Challenger Exped	10	1	5	- 88			

Malo	Kolz.	Challenger Exped	61	145		23	•
:		Mr. Doerries	18	150	8	59	
\mathbf{Do}_{\cdots} $b \mid \cdots \cdot \mathbf{do}_{\cdot} \cdot \cdots \cdot \mathbf{do}_{\cdots}$	ob	do	61	151	8		
1835 (d)	Jирвп		18	147	8	76	
Do 2994 (d) Possiet Ba	Possiet Bay, Coast Province B. Dybowski	B. Dybowski	61	146	8		
Do 2995 (d)do	opop	ор	19	\$ 1	8	62	•
a Description p. 266; figs. 239-241.	30-241. b Sci. Coll. No. 67.	e Boulenger, Cat. I. p. 222	at. I. D. 2	- 8i	-	d Strauch, p. 277.	;

NATRIX TIGRINA a (Boie).

YAMA GAMISHI.

Plate XIX.

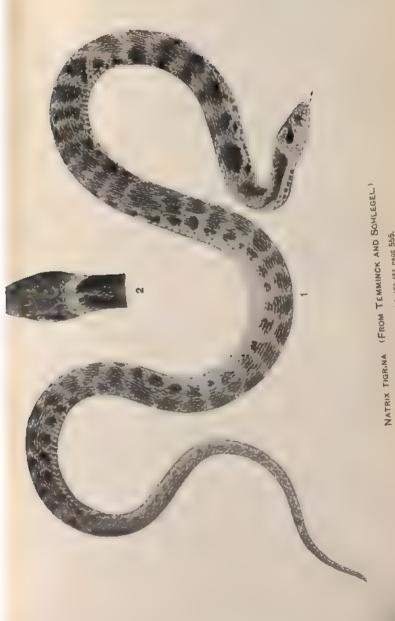
1826. Tropidonotus tigrinus Boie, Isis, 1826, p. 205 (type-locality, Japan; Blomhoff, collector); Bijdr. Natuurk. Wetensch., II, Pt. 1, 1827, p. 250.—Tem-MINCK and Schlegel, Fauna Japon., Rept., 1837, pp. 85, 139; Ophid., pl. IVb (Japan.)—Schlegel, Phys. Serp., II, 1837, p. 315 (Japan).—Guenther, Cat. Colubr. Sn. Brit. Mus., 1858, p. 71 (part: Japan); Rept. Brit. India, 1864, p. 271 (part: Japan).—Martens, Preuss. Exped. Ost-Asien, Zool., I, 1866, p. 110 (Yokohama); 1876, p. 379 (Tokyo, Nagasaki).—Strauch, Mém. Acad. Sci. St. Pétersb. (7), XXI, no. 4, 1873, pp. 176, 277 (part: Japan).—HILGENDORF, Mitth. Deutsch. Ges. Ost-Asiens, I, heft 10, 1876, p. 30 (Tokyo); Sitz. Ber. Naturf. Fr. Berlin, 1880, p. 115 (Tokyo).—Boulenger, Cat. Snakes Brit. Mus., I, 1893, p. 249 (part: Kobe), III, 1896, p. 607 (Shimabara).—FRITZE, Mitth. Deutsch. Ges. Ost-Asiens, V., 1891, p. 239 (not in Yezo).—Okada, Cat. Vert. Jap., 1891, p. 68 (Tokyo; Nikko; Osaka; Suwo; Awachi; etc.).—Boettger, Kat. Schl. Mus. Senckenberg, 1898, p. 25 (part: Nikko; Yokohama; Yezo).— Wall, Proc. Zool. Soc. London, 1903, p. 99 (Japan); 1905, II, p. 513 (Yaku I., Tanega I.).—Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, no. 1, 1905, p. 222 (Nagasaki; Unzen).—Amphiesma tigrinum Dumèril and Bib-RON, Erpét. Gén., VII, Pt. 1, 1854, p. 732 (Japan.)—Bleeker, Natuurk. Tijdschr. Nederland. Indië, XVI, 1858, p. 204 (Japan).—Hallowell, Proc. Phila. Acad., 1860, p. 499 ([Simoda] Hondo).

Description (figs. 242-243).—Adult male; U.S.N.M. No. 31846; Sendai, province of Satsuma, Kiusiu; June 4, 1903; Dr. H. M. Smith, collector. Rostral much broader than high, well visible from above; internasals somewhat smaller than prefontals, truncate in front, the suture with rostral slightly longer than the suture of rostral with first supralabial; prefrontals in contact with supraoculars; frontal much broader than supraoculars, about as long as its distance from tip of snout and as interparietal suture; parietals about as long as distance of eye from tip of snout; nostril lateral, large, between two nasals, of which the posterior is higher than the anterior; loreal pentagonal, as high as long; two preoculars, the upper not in contact with frontal; three postoculars; temporals 1+2, those of the second row being abnormally fused on the left side; 7 supralabials, fifth and sixth largest, fourth and fifth entering eye; 5 lower labials in contact with anterior chin-shields, which are considerably shorter than posterior; 19 rows of long, narrow, strongly keeled scales, each with two large oval apical pits same distance from the tip; 161 ventrals; anal divided; 83 pairs of subcaudals. Color (in alcohol) above tawny-

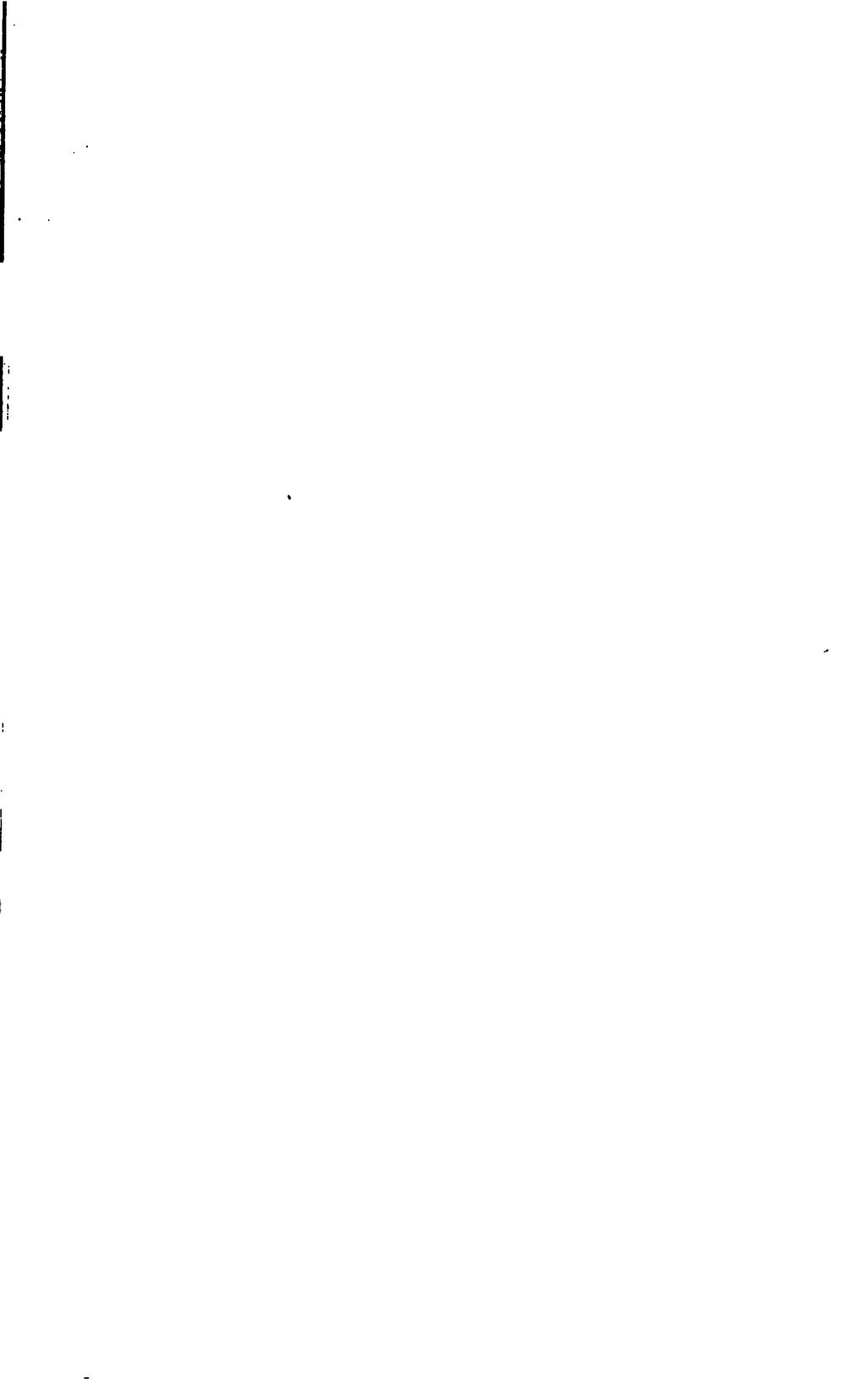
a Signifying tiger-like, probably with reference to the red and black spots on the sides. According to von Siebold this species is in Japan also called *Torano Kuchinaha*, and according to von Martens, *Torasuhebi*, both meaning tiger snake.

b Reproduced in this work on Plate XIX.

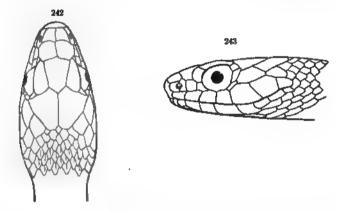
c In life, according to Dr. H. M. Smith, these snakes are "greenish above, with black and orange blotches intermingled; head greenish above; belly slate color."



FOR EXPLANATION OF PLATE SEE PAGE 555.



olive (light bluish gray where the epidermis has come off), with broad black crossbars on the anterior part of the back, soon breaking up into four series of large squarish and alternating black spots; the outlines of the dark and light colors is very ragged and the keels light colored, even in the black patches as if the light color pattern had been produced by scraping off the black color with a knife from an uneven surface; temporal region dark, with a black line crossing obliquely from upper postocular across anterior temporal, upper portion of sixth supralabial, and middle of seventh to angle of mouth; supralabials yellowish, narrowly edged with black along the posterior suture, the one below the eye on the fourth being heaviest; throat yellowish, a broad band of similar color curving up behind the temporal region so as to form a collar; lower neck yellowish, the under-



Figs. 242–243.—Nateix tigrina. $1\frac{1}{2}$ x nat. size. 242, top of head; 243, side of head. No. 7385 U.S.N.M.

side gradually becoming darker posteriorly, each ventral being marked basally with an increasing amount of dark slate color until the underside posteriorly is nearly uniform slaty black.

Dimensions.	
	mm.
Total length	682
Snout to vent	507
Vent to tip of tail	175

The young do not differ materially from the adults.

Our largest specimen (No. 12711) measures about 935 mm. in total length, and probably few grow to be more than 1 meter in length.

Variation.—The scale formula of this species is fairly constant. All the specimens examined and on record have 19 scale rows, a divided anal (except No. 33988), and seven supralabials (two of our specimens have only six on one side). Hilgendorf in a series of 40 found only one in which the two preoculars were fused into one, and all

the 53 specimens examined by me for this character have two, except one, in which they are fused on one side, and two which have three preoculars on one side.^a The temporals are almost always 1 + 2, though one of our specimens (No. 7386a) has 2 + 2 on one side.^b On the other hand, the postoculars vary between 3 and 4 and sometimes only 2; in our large series there are only three specimens which have 4 postoculars on both sides, and eight which have 4 on one side, but Hilgendorf c found 3 and 4 in about even proportion, viz, 23 with 3 and 28 with 4 on both sides, and 7 with 3 and 4 unsymmetrically (unless his statement involves some misprint, for instance, 8 instead of 28).

The coloration and markings, however, are very variable, especially the size and arrangement of the black spots and the amount of black on the underside. In the latter respect specimens vary without regard to locality between almost solid black and uniformly greenish white. The upper surface is often so dark that the dorsal blotches can be made out only with difficulty, but in most cases the orange-colored spots occupying the second, third, and fourth scale rows on each side are very conspicuous. The orange color is confined to the base and lateral margins of the scales, the median portion and tip being blackish, forming linear spots within the bright area.

The few Korean specimens examined by me have the dorsal blotches less differentiated and scarcely alternating with the lateral ones, thus forming more or less continuous crossbars and approaching what appears to be the common coloration of northern specimens of Natrix lateralis.

Habitat.—This species, as here restricted, is confined to Japan and southern Korea, being represented in the coast regions of the mainland by a closely allied form described hereafter.

The only definite locality of this species in Korea is Fusan, whence we have a specimen collected by Jouy. Two other specimens from Korea have also been examined by me, but their exact locality is uncertain, though probably either Fusan or Seoul.

The tiger snake seems to be common in Kiusiu and Hondo. Blom-hoff, Siebold, and Buerger collected numerous specimens in the neighborhood of Nagasaki; von Martens obtained it for the Berlin Museum in Nagasaki, Yokohama, and Tokyo; British Museum has specimens from Kobe collected by the *Challenger* expedition and from

a One specimen (No. 33994) has the lower preocular on both sides fused with the loreal which thus enters the eye. Dr. Wall has examined three specimens with the loreal confluent with the postnasal on both sides, and one similarly abnormal on one side.

b No. 33999 has a small abnormal scale-like shield separated off from the upper anterior edge of the first temporal and not reaching the second.

cSitz. Ber. Naturf. Fr. Berlin, 1880, p. 115.

Shimabara by Holst. Museum Senckenbergianum also has a specimen from Nikko, and finally the U.S. National Museum possesses specimens from Satsuma and Miyazaki, Kiusiu, as well as from Osaka, Oide, Simoda, Suruga, Mori, Yokohama, and Tokyo. Dr. H. M. Smith collected numerous specimens in Shikoku. Dr. Wall has recently recorded it from the islands of Yaku and Tanega, south of Kiusiu.

Its occurrence in Yezo is doubted by Fritze whose collectors failed to obtain it in that island, and Nozawa does not include it in his list of Yezo reptiles communicated to me, so there is apparently no specimen in the Sapporo Museum. Boettger, however, records two adult specimens which the Senckenberg Museum obtained from Schmacker in 1889 as having been collected in Yezo. I must here recall the fact, however, that specimens of Rana japonica and Eumeces latiscutatus (see pp. 111 and 199) from the same locality and source are not above suspicion. Altogether Schmacker's Yezo records require confirmation.

It is not recorded from the Riu Kiu Islands. There is in the Imperial Museum at Ueno Park, Tokyo, a specimen (No. 20) which is said to have been collected at Naha, Okinawa shima. Beyond a somewhat unusual low number of ventrals plus subcaudals this specimen is exactly like Tokyo specimens, and most likely some error has occurred in labeling.

List of specimens of Natrix tigrins.

Supra- lablals.	[-	14	₽~	ŀ÷	P	ţ~	ļ-	ŀ	P=	Ē-s	M	P=	ţ-	Þ.	Ì	2-	ì-	P=	ľ•	P-	Ì-s	ř=	ŀ•	1-	P=	P-r	l-	2-	P-s	P-
Tempo-	1+2	1-2+2	1+1	1+2	1+2	1+2	1+2	1+2	1+1-3	1+3	1+2	1+3	1+2	1+2	1+2	1+2	1+2	1+2	1+2	1+2	1+2	1+ 2	1+2	1+2	**	1+2	1+2	2+2	1+2	1+3
Oculars.	64	C-6	64 120	2,4	2,3	es cel	2,4	ट्य	c4	69	2,3	1-2,3	2,3	2,3	2,3	5 3	ei ei	2,3-4	2,2-3	ଜ	C4 C9	50	6.8	2,2	2,53	2,3	50 04	es cvi	2,2-3	, 63 63
Sub- reale caudale, and sub-	238	240	235	230	:	233	22	872	244	34	232	236	237	243	222		87	235	248	222	92	236	ŽĬ	237	240	230	237	235	22	228
Sub- candals.	53	74	72	69		E	67		23	75	F	2	1/8	82	2		E.	36	8	27	2	73	8	12	74	22	96	17	74	22
Ven- trala,	162	166	163	181	160	160	165	156	181	169	150	157	150	158	157	153	157	159	168	160	160	162	125	162	186	157	157	164	160	165
Scale rows.	19	61	161	18	61	19	10	91	10	20	61	10	61	61	19	18 .	18	119	10	91	18	18	10	9	19	10	91.	10	10	10
When col- By whom collected or lected from whom received.	Doctor Morrow	May , 1855 W Stimpson.	-dodo ор	4pr , 1881 P. L. Jouy	do do ob	ф	+ + + + + + + + + + + + + + + + + + + +	Ort ,1882	June 4, 1903 . H. M. Smith	June ,1903), do	May 8, 1903 do	do do ob	May 11, 1903 .do	. do do	do do	do do oh	dodo	Mus , 1803 . do	op op	do do	do do	ор ор	do do	op op.	по фо	do do	dodo	July -, 1886 A. Owston	dodo	dodo
age Locality	Simoda Japan	Je.	.lo.	Yokohama, Japan	qo	do	յորսո	Olde Shinship Japan	Sendal Satsuma, Kinsul,	· op	. Suzaki Tosa, Shikoku	do.	Kochi Tosa Shikoku	do	da.	do	do .	do	do	do	do	4]49	do	lo	do	do	oh .	Mount Full, Hondo	. do	do
Sexanda	Female	de	190	400	Hallgr	Yearng	Female	Made	do	Halfgr	Female	Haffgr	d,	eş.	op.	Marc	d b	Female	do	ф	do)	į.	II i fgr	Marie	Ferra 10	YOUR	op.	Female.	Male.	Female.
c Z	7385	738h n	73Ms 2	12711	17712	1,771.3	14,4"	15420	3,846	31847	31848	31840	31853	31854	3,855	31850	31251	318.0	314:1	できる	SINE	\$ -385-4	3 16.0	200	3.43	3,800	31871	30882		20084
Museum.	.B.N.K.	Do	Do	Do	Φο	Do	Do	Do	Do.	Do	Do	Do	Do	Dο	De :	Do	Ъ.	Do	Do.	Dο	, Δ	å	Dο	Do	Do	Do	Do	Do	Do	Do

Do	3398.5	do	do	.do	do	19	162	71	333	2,3-4	1+2	7
Do	339%	Male	-do	.do	do	19	162	8	242	2,3-4	1+1-2	7
Do	33987	Female	ob.	.do	do	19	163	8	233	2,3-4	1+2	7
Do	33988	Male d	do.	.do	do	19	162	92	238	2,3	1+2	Ţ
Do	33989	do	- op	ob.	do	22	157	92	233	2,4	1+2	2
Do	33990	Young	- op	op.	do	19	156	22	822	2,3	1+2	2
Do	33991	Female	op	op	do	19	164		-	2,3	1+2	2
Do	33992	do	op	ob.	do	19	191		•	2,3	1+2	7
Do	33993	Male	op	op	do	19	155	74	82	2,3-4	1+2-3	7-9
Do	33994	Female	op	op	do	19	168	11	230	2,3-4	1+2	2
Do	33995	Male	op	.do	do	19	159	78	238	2-3,3	1+3	7
Do	33996	do	op	do		19	162	—		2,3-4	1+2	7
Do	33997	•	op	-do	фо	19	150	88	241	2,3	1+2	~
Do	33008	Female	op	.do	do	19	168	69	237	2,3-4	1+2	7
Do	33000	do. /	Mori, near Yokohama Oct.	t, 1902	do	19	191	3 8	727		1+2	~
Do	34000	do	op.	.do	do	19	164	8	233	2-3,3	1+2	2
Do	34001	Male	Suruga, Hondo Nov.	v, 1903	do	19	160	8	823	2,3	1+2	2
Do	36541	Female	Tokyo, Hondo		Sci. Coll. Tokyo	19	162	92	222	2,4	1+2	7
Brit. Mus	a	Mule 9	Japan			18	162	78	240 }			
Do	9	do.ø	op			19	159					
Do	v	do.ø	op			19	158	3	242			
Do	ø	Females	op			19	163	7.	237			•
Do	•	do.ø	op			18	164	11	222			•
Do		Male g	Kobe	•	Challenger Exped	19	160	92	238	•.		
Do	0	Female 9	do	•	do	19	163	8	243	:		
Do	æ	do.ø	op		op	19	166	22	823	:		•
Do	4	do	Shimabara, Hizen, Kiusiu		P. A. Holst	18	191	12	22	-		•
Bt. Petersb	1906	ε	Japan		Leiden Mus	19	164	88	247	2,3		
Do	1910	ε	op	•	do	18	164	7	235	2,3		
Do	1911	3	- op		do	19	166			2,4		
D. B. N. M.	14611	Male	Korea		Dr. N. M. Ferebu	18	181	23	234	2,3	1+2	7
Do	17509	do	Fusan, Korea	1885	P. L. Jouy	18	163	. 49	230	643	1+2	~
Mich. Univ	30628		Korea		G. A. Olinger	19	165			2,2-3	1+2	7
						-				; ; ;		

d Anal undivided. Loreal fused with preocular. / P. 274. g Boulenger Cat. I, p. 250. A Boulenger, Cat. III, p. 607. . 242-243. b P. 273. c Description p. 272. th., p. 277.

NATRIX TIGRINA LATERALIS a (Berthold).

- 1858. Tropidonotus tigrinus Guenther, Cat. Colubr. Sn. Brit. Mus., p. 71 (part: Ningpo, China); Rept. Brit. India, 1864, p. 271 (part: northern China); Ann. Mus. Zool. St. Pétersbourg, I, 1896, p. 205 (Huihsien, prov. Kansu, China).—Strauch, Mém. Acad. St. Pétersbourg (7), XXI, no. 4, 1873, p. 176 (part: Strelok, Bay of Peter the Great, Amurland).—Giglioli and Salvadori, Proc. Zool. Soc. London, 1887, p. 594 (Olga Bay; Gensan).— Boulenger, Ann. Mag. Nat. Hist. (6), V, Feb., 1890, p. 139 (Gensan, Korea); Cat. Snakes Brit. Mus., I, 1893, p. 249 (part: Gensan; Chefu; Peking; Ningpo; Kiukiang; Hainan); III, 1896, p. 607 (part: Chefu); Proc. Zool. Soc. London, 1899, p. 164 (Fokien).—Boettger, Ber. Senckenberg. Naturf. Ges., 1894, p. 139 (Lueshan Mts., Kiukiang, China); p. 146 (Delanshan, near Ningpo); p. 149 (Weihaiwei and Chefu); Kat. Schl. Mus. Senckenberg., 1898, p. 25 (part: northern China).—Wall, Proc. Zool. Soc. London, 1903, p. 86 (Yangtse Valley).—Werner, Abh. Bayer. Akad. Wiss. (Muenchen), II Klasse, XXII, Pt. 2, 1904, p. 354 (Hankow).—Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, No. 1, 1905, p. 222 (part: Hongkong; Possiet Bay; etc.).—Amphiesma tigrinum STONE, Proc. Phila. Acad., 1899, p. 184 (Peking; northern Pechili).
- 1859. Tropidonotus lateralis Berthold, Nachrichten Ges. Wiss. Goettingen, 1859, p. 180 (type-locality, China; type in Goettingen Mus.).—Jan, Icon. Ophid., livr. 25, 1867, pl. v, fig. 1 (Bangkok, Siam).
- 1862. Tropidonotus orientalis Guenther, Proc. Zool. Soc. London, 1861, p. 391 (type-locality, Peking; types in Brit. Mus.; Swinhoe, collector); Ann. Mag. Nat. Hist. (3), IX, Jan., 1862, p. 59, pl. 1x, fig. 3.—Strauch, in Przewalski's Mongoliya i Strana Tangutov, III, 1876, p. 48 (Ordos; Peking).

A glance at the list of specimens and their scale formulas under N. tigrina (p. 276) and the present form (p. 280) is sufficient to show that the latter is separable from the former by the lower number of scutes covering the underside of the body. There is not a very great difference in the number of ventrals (average 160.5 ventrals in 62 N. tigrina, and 155.6 in 20 N. lateralis) but the subcaudals are much more numerous in the Japanese form than in the Chinese. 54 specimens of the former they range between 66 and 85, while in 18 specimens of the latter between 53 and 64, thus leaving a perceptible gap between these two series. The sum of ventrals and subcaudals in doubtful cases will assist in identifying these specimens, for I find that in the above series the total number of scutes in N. tigrina varies between 227 and 248, and in N. lateralis between 206 and 224, the difference between the extremes in the former being 21 and in the The average between these two series, 236.1 for N. tigrina and 215.2 for N. lateralis, therefore, is probably very nearly exact.

While there is thus a small gap in the formulas available, it can hardly be doubted that larger series would bridge it, and in view of the exceedingly close relationship of the two forms and their ranges unquestionably meeting in Korea, it is thought best to use a trinominal appellation for one of them. According to present usage and

the various codes of nomenclature, the last-named form receives the trinominal; thus in this case the Chinese form becomes Natrix tigrina lateralis.

In the above discussion I have made no reference to a specimen in the Imperial Museum, Ueno Park, Tokyo (No. 20), alleged to have been collected at Naha, Okmawa Shima. As already mentioned under N. tigrina, this locality is so unsupported by other evidence that one is justified in suspecting a mistake in labeling. This specimen, according to the count which I made while in Tokyo in 1895, has 163 ventrals and 64 subcaudals—showing the minimum in the abovementioned series of Japanese specimens. It is otherwise identical with specimens of the tiger snake collected around Tokyo, and I have but little doubt that it is a Japanese specimen of N. tigrina, with a minimum number of scutes, if my count was really correct.

There is no specimen of this form in the United States National Museum, but as the chief difference from N. tigrina consists in the lower number of ventrals and subcaudals, as indicated above, a detailed description is not necessary. In all other respects the scale formula agrees with that of the Japanese form. The color appears to differ in the absence of alternation of the dorsal and lateral spots. Doctor Guenther describes the color of the types of his Tropidonotus orientalis as follows:

"Greenish olive, with three series of black spots anteriorly, becoming very indistinct on the middle of the trunk; a black subcrescentic spot on each side of the neck, without yellow, posterior margins of the upper labials and a spot on the temple black. Belly more or less blackish."

Habitat. The mainland form of the tiger snake is distributed along the eastern coast of Asia from Olga Bay in the Russian Coast Province to Hainan and, if Jan's localities are correct, to Cochin China and Siam.' Boettger even seems to think that the specimen in British Museum credited to Hainan may have come from some other locality, or at least from the mountainous interior of that island. Possibly the Siamese origin also refers to specimens obtained in the mountains of the interior. It is not recorded from Formosa. Westward it has been found by Berezowski as far as southern Kansu, the province next to Thibet.

Both Mr. Leech and Doctor Giglioli obtained specimens in Gensan, northern Korea, and the Warshaw Museum has it from Strelok, a military post on the Bay of Peter the Great. Giglioli even obtained

of It may not be out of place to remark here that in Proc. Zool. Soc. London, 1899, p. 661, Mr. Stanley S. Flower gives a table of 21 specimens from Penang Kedan, a Bangkok, which has the appearance of belonging to Tropodonotus tigrinus. This due to a mistake in the typography, as the table, which is not self-explanatory, v apparently meant to follow the account of Tropodonotus piscutor.

it as far north as Olga Bay, also the west side of the Sea of Japan. The types of Guenther's T. orientalis were collected by Swinhoe at Peking and the Philadelphia Academy has it from the same locality.

List of specia	urns of	Natrus	lateralis.
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Muteum.	No.	Sex and age.	Locality.	When col- lected	By whom col- lected or from whom received.	Soale rows.	Ventrale.	Babeaudals.	Ventrals+
Goettingen		(4)	China	1		19	157	56	213
Brit. Mus	k	Male b .	Peking, China		R. Swinhoe	19	153	63	216
De,	1	Younge	.do	! ,	do	19	184	60	224
Do	399.	Malo	Chefu, China		, .do.,	19	150	64	214
Do	9	dn	do		40	10	161	57	218
Do	0	do	do		do	19	154	65	219
Do	р	Female.	do		do	19	157		
Do	- 1	Young .	,do,,,,,			19	151	64	215
Do	e	Younge	do			19	153		
Do	g	Femalo ^c	Ningpo, China	!		19	160	56	215
Do	r	do.4,.	Kiukiang, China		A. E. Pratt	19	15		
Do		do.d	Hainan Island, Chir	16	J. Neumanu	19	160	56	216
Bouckenhorg . :	7249 c	Halfg.c.	Chefu, China		B. Schmacker .	19	354	63	217
Do	7249 c	do.e	do		do	19	159	53	212
Do	7249d	Adult/	Dalanshan, China		do.,	19	150	58	217
Do	7249 (do.r	Weihaiwei, China		do	19	159	54	213
Do , ,	7240 Å	do.g.,	Lueshan Mts., China	a	do	19	151	55	206
Munich'		Malek	Hankow, China		Doctor-Haberer	19	150	63	213
St. Petersh		L (1)	Ordos, China		Przewalski	19	147	63	210
Do		(0)	Peking, China		do	19	153	50	212
Brit. Mus	4	Male 4	Genran, Korea,		J. H. Leech.	19	159	63	222
		1							

NATRIX STOLATA (Linnæus).

1758. Coluber stolatus Linnaus, Syst. Nat., 10 ed., I, p. 219 (type-locality "America, "type in Roy, Mus. Stockholm); 12 ed., I, 1766, p. 379 (Asia).— Natrix stolatus Merrem, Syst. Amph., 1820, p. 123.—Steineger, Journ. Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 221 (Taipa, Formosa).—Tropidonotus stolatus Bore, Isis, 1827, p. 535. - Swinhoe, Ann. Mag. Nat. Hist. (3), XII, 1863. p. 225 (Tamsui, Formosa).—Guenther, Rept. Brit. India, 1864, p. 266 (India to Formosa).—Bot LENGER, Fauna Ind., Rept., 1890, p. 348, fig. (India to southern China); Cat. Snakes Brit Mus., I, 1893, p. 253 (India to China, Hainan, Formosa), -- Boettrger, Ber. Senckenberg. Naturf, Ges., 1894, p. 132 (Hainan).—Wall, Proc. Zool, Soc. London, 1903, p. 86 (Hongkong) - Amphicsma stolatum Dunkhu and Bibron, Erpét. Gén., VII., Pt. 1, 1854, p. 727,

1801. Elaps bilineatus Sennemer, Hist. Amph., II, p. 299 (type-locality, East Indies, type in Mus. Bloch

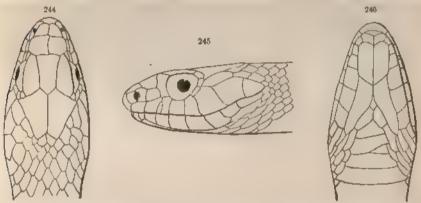
a Type of lateralis b Type of orientalis; Boulenger, Cat. I, p. 250. f Boulenger, Cat. III, p. 607. d Boulenger, Cat. I, p. 250.

⁽Strauch, p. 48.

Boettger, 1894, p. 149.
 Boettger, 1804 p. 146.
 Boettger, 1894 p. 139.
 Werner, p. 354.

a Signifying wearing a stole, with reference to the two light-colored longitudinal bands

Description (figs. 244 246). Adult male: U.S.N.M. No. 34036; Taipa, Formosa; March, 1903; A. Owston collection. Rostral much broader than high, well visible from above; internasals slightly shorter than the prefrontals, very narrow in front, their suture with rostral considerably shorter than suture between rostral and first labial; prefrontals in contact with supraoculars, frontal longer than its distance from tip of snout and interparietal suture; parietals equaling the distance of eye from tip of snout, nostril large, between two subequal nasals; loreal somewhat longer than high, upper edge shorter than and parallel with lower; one preocular, not in contact with frontal, 3 postoculars; temporals 1 + 2; supralabials 8, third, fourth, and fifth entering eye, sixth and seventh largest; 5 lower labials in contact with anterior chin-shields which are shorter than the posterior: 19 rows of scales, strongly keeled except outer row, and without apical pores; 149 ventrals; anal divided; 81 pairs of subcaudals. Color (in alcohol) above brownish gray with numerous



Figs. 244–246.—Natrix stolata -2 < nat size. 244, top of head, 245, side of head, 246, underside of head. No 36510 U S N M

narrow black crossbars alternating on each side of the median line anteriorly but continuous farther back: across this pattern two longitudinal, dorso-lateral pale bands occupying the whole of sixth scale row and the adjacent halves of fifth and seventh rows; posteriorly these bands are nearly uniformly pale, but anteriorly they exhibit a kind of chain pattern, inasmuch as the outer edges of the middle scale row are black except where the band intersects as black crossbar; below the lateral band many small irregularly alternating black spots; top of head with obscure dusky edges to the shields; no nuchal collar; supralabials whitish, the light color extending upward on the preocular and the lower postoculars, the vertical edges of t' labials heavily margined with black as are also the preocular in from the postoculars behind, the vertical, black edged, white bar front of the eye being very characteristic; underside uniform whitis each ventral with a black mark near the outer edge.

Dimensions.

	mm.
Total length	522
Snout to vent	
Vent to tip of tail	140

This snake is not a large one, and a length of 700 mm. is probably seldom exceeded.

Variation.—Comparatively little variation is noted in the head shields of this species. The ninth supralabial noted in one of the Taipa specimens is merely a narrow wedge interpolated between the second and third supralabials, as shown in fig. 245. The range of ventrals and subcaudals is also restricted in the Formosan series, as shown in the table given below, but in specimens from all over the wide area inhabited by this species they vary between 120 and 161 and between 50 and 89, respectively. It seems, however, as if this wide range is more or less correlated with various geographical subdivisions.

Habitat.—From India to Philippine Islands and China. One of the most widely distributed species in southeastern Asia.

There are five species in the British Museum, collected by R. Swinhoe in Formosa, and I have recorded four specimens from Taipa, Formosa, collected by Mr. Tada. Our museum has since received three more from the same locality through Mr. Owston. In the Hamburg Museum there is also a specimen (No. 1563) collected by Doctor Warburg at Kelung, northern Formosa.

c Boulenger Cat. I, p. 254.

a Description, p. 281.

List of specimens of Natrix stolata.

Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected or from whom received.	Scale Ven- rows. trais.		Anal.	Sub-	Oculars.	Tempo- rais.	Supra- lablals.
U.S.N.M.	34035	Жаlе	Taipa, Formosa	Маг, 1903	A. Owefoil	19	148			1,3	1+2	∞
Do	34036	do a	do	do	do	61	140	64	81	.1,3	1+2	∞
Do	34037	Female	do	do	do	19	140	61		1,3	1+2	∞0
Do	36510	dob	do	Sept., 1897	T. Tada	61	146	63	74	1,3	1+2	6-8
Sci. Coll. Tokyo	b 14	do	op	do	do	19	150	61	74	1,3	1+2	∞
Do	c 14	Male	do	do	do	19	146	7	8	1,3	1+2	∞
Do	d 14	Female	do	do	do	13	147	8	74	1,34	1+2	∞
Hamburg	1563	Male	Kelung, Formosa		Doctor Warburg	19	142	 8	12	1,3	1+2	∞ 0
Brit. Mus	k	do c	Formosa		R. Swinboe	19	147	5	8			•
D_0	Q.	do e	do		do	19	147	8	75		•	•
Do	ь	Female c	op		do	19	148	61	75			
Do	٠	do c	do		do.	18	149	7	72			
Do	2	do c	do		do	19	149	2	23		•	

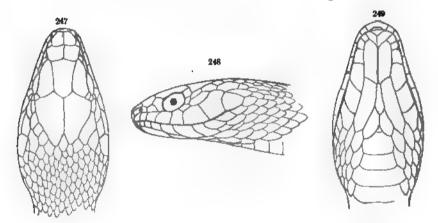
NATRIX PRYERIa (Boulenger).

GARASU HEBU (Okada),

Plate XX.

1887. Tropidonotus pryeri Boulenger, Proc. Zool. Soc. London, 1887, p. 149, pl. xviii, fig. 3 b (type-locality "Loo (hoo Islands," types in Brit. Mus.).— Boulenger, Cat. Snakes Brit. Mus. I, (1893), p. 250 (Great Loo Cheo I.).— Fritze, Zool. Jahrb. Syst., VII, 1894, p. 862; author's separate p. 13 (Nafa, Okinawa shima). Boettger, Offenbach. Ver. Naturk. 33-36 Ber., 1895, p. 107 (Okinawa shima; Miyakoshima group); Kat. Schlangen Mus. Senckenberg., (1898), p. 26 (Okinawa shima and Miyakoshima); Wall., Proc. Zool. Soc. London, 1903, p. 100 ("Nawa, Loo Choos"); 1905, II, p. 515 (Okinawa; Amami; Irimote).

Description.—Adult female; Science College Museum, Tokyo, No. 6; Iriomote shima, southern group, Riu Kiu Archipelago; Tashiro, col-



F108. 247-249.—NATRIX PRYERI. $1\frac{1}{4}$ \times NAT SIZE. 247, TOP OF HEAD; 249, SIDE OF HEAD, 249, UNDERSIDE OF HEAD, NO. 6, Sci. Coll. Tokyo.

lector (figs. 247-249). Rostral nearly twice as broad as high, just visible from above; internasals fully as long as prefrontals, rather truncate anteriorly, their suture with rostral equaling that of the latter with first supralabial; prefrontals in contact with supra-oculars; frontal longer than its distance from tip of snout, wider in front than behind, wider than supraoculars; parietals longer than distance of eye from tip of snout; nostril between two subequal nasals; loreal longer than high; one preocular, not in contact with frontal; three postoculars (normal), four on right side; 2+1 temporals, the lower one of the second row on both sides abnormally

⁶ For Henry James Stovin Pryer, a well-known naturalist and collector, who lived, as a merchant in Yokohama for many years. He was at one time connected with the Museum of the Educational Department Museum in Tokyo. Born in London, June 10, 1850; died in Yokohama, February 17, 1888.

b Reproduced in this work on Plate XX.







NATRIX PRYERL FROM BOULENGER.) FOR EXPLANTION OF PLATE SEE PAGE 555.

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<u>-</u> .	· -·		

fused with seventh supralabial; eight supralabials, fourth and fifth entering eye, sixth and seventh largest; five lower labials in contact with anterior chin-shields which are shorter than the posterior; 19 rows of scales, with two apical pits, all keeled; 170 ventrals; anal divided; (tail broken). Color (in alcohol) pale clay-color, with long, dark, dorso-lateral, slightly alternating blotches anteriorly separated by whitish, black-edged, vertical bars on the sides, this pattern shortening up posteriorly and resolving itself into smaller dusky spots on the back and a series of whitish spots on the sides; supralabials whitish, the anterior five with black posterior margin; an oblique black line from the middle postocular, across lower portion of lower anterior temporal, sending a short branch downward along upper third of posterior edge of sixth supralabial, crossing the seventh labial nearly diagonally and the lower anterior corner of the eighth labial to the angle of the mouth; the lower, anterior and upper margins of the latter black, isolating a sharply-defined whitish spot; behind the angle of the mouth a round whitish black-edged spot continued backward and upward to the middle of the neck as a similarly edged but slightly narrower whitish band forming a crescent, or rather a chevron, on the nape; underside uniform pale, with a series of small dusky spots on each side near the outer angle of the ventrals and subcaudals.

Dimensions.	
1	mm.
Snout to vent	675
Tail defective.	

The tail in this species is nearly one-third the total length. A specimen in British Museum measuring 930 mm. has a tail 300 mm. long. A similar proportion would give a total length for the specimen described above of about 1 meter, probably near the maximum length of this species.

Variation.—Scale formula fairly constant. Temporals are said rarely to be 1 ÷ 2: the specimen described above has 2 ÷ 1 instead of 2+2; it has also four postoculars on one side instead of three, the normal number. Dr. Wall has recorded a specimen with two postoculars on one side. Ventrals range between 170 and 181 in thirteen specimens, and subcaudals between 114 and 128 in seven specimens.

Remarks.—The color pattern of head and nape of this species is an enlarged copy of that of Natrix vabakari, craspedogaster, and khasiensis: the black margin to the anterior supralabials; the oblique, black postocular band crossing the upper half of the penultimate labial and the lower margin of the last one, thereby separating it from the others; the dark upper edge to the last thus isolating a well circumscribed whitish spot on the latter; the subsequent postoral light spot and temporo-nuchal crescent edged with dusky; each on

of these features is more or less plainly indicated in all these species. The median nuchal light streak described in N. vibakari is not visible in the specimen of N. pryeri before me, but it is very distinct in the figure accompanying the original description of the species a herewith reproduced (Plate XX, fig. 2); the lateral spots on the ventrals are common to all these species, though not by any means confined to them. The white dorso-lateral spots of the young of N. vibakari are very marked in N. craspedogaster and also on the posterior part of N. pryeri. The sudden increase in the size of the posterior maxillary teeth of the latter is no real obstacle, for as I have shown above (p. 264) N. vibakari may with propriety be said also to have suddenly enlarged posterior maxillaries. Moreover, Natrix chrysarga, which all authors agree in referring to the so-called "Amphiesma" group, appears also to belong to the assembly of species here discussed, in spite of the fact that the posterior labials are not quite typically marked, though judging from Jan's figure of his Amphiesma platyceps, the Himalayan specimens at least may come pretty close to the characteristic pattern.

Habitat.—This species has now been recorded from all the groups of the Riu Kiu chain. The types were from the "Loo Choos," without further locality, but both Holst and Fritze obtained it in Okinawa shima, from which island specimens also are in the National Museum in Tokyo (no. 8) and in Museum Senckenbergianum. The latter also has a specimen from Miyakoshima in the Saki shima group, both obtained through Mr. Schmacker. Finally, a specimen from Nishiomote shima, also called Iriomote shima, of the same group, is in the Science College Museum, Tokyo. Dr. Wall has recently recorded a specimen from the latter island and three from Amami-o-shima, of the northern group.

a Proc. Zool. Soc. London, 1887, pl. xvIII, fig. 3.

List of specimens of Natrix pryeri.

Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected, or from whom received.	Scale rows.	Ven- trals.	Anal.	Subcaudals.	Oculars.	Tem- porals.	Supra- la cials.
Bci. Coll. Tokyo	9	Female a	Iriomote shima, Riu Kiu.		Tashiro	19	170	2	•	1,34	2+1	30
Nat. Mus. Tokyo	20	Male	Okinawa shima, Riu Kiu.	•		19	178	67	•	1,3	2+2	∞
Do		Female	do			10	178	63	-	1,3	2+2	∞
Do		do	do			19	174	8	121	1,3	2+2	∞
Brit. Mus	a	Маю в	"Loo Choo"		H. J. S. Pryer	19	180	8	121	1,3		∞
Do.	Q	do.b	op.		do	19	181	6		1,3		∞
Do.	v	do.h	do		do	19	181	8	128	1,3		∞
Do.	8	Female b	do		do	19	176	63		1,3		∞
Do	•	do.c	Great Loo Choo	•	P. A. Holst	19	171	8	114	1,3		∞
Do	1	Young c	op,		do	19	171	8	118	1,3		∞
Senckenb.	7250a	do.d	Okinawa		B. Schmacker	19	175	8		•		
Do	7250b	Adult d	Miyako shima		do	19	176	61	118			
Do		do.d	do.		ор	13	179	61	125			
a Description, p. 284, figs. 247-249.	n, p. 284	figs. 247-249.	b Boulenger, Cat. I, p. 251; types.	p. 251; types.	c Boulenger, Cat. I, p. 251	. I, p. 25	- - - -		d Boettger, 1895, p. 107	 er, 1895, j	b. 107.	_•

NATRIX PISCATOR 4 (Schneider).

1799. Hydrus piscator Schneider, Hist. Amphib., I, p. 247 (type-locality, East Indies).—Natrix piscator Merren, Syst. Amphib., 1820, p. 122. Stejneger, Journ. Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 221 (Taipa, Formosa).—
Tropidonotus piscator Boie, Isis, 1827, p. 535.—Boulenger, Cat. Sn. Brit. Mus., I, 1893, p. 230 (India to southern China and Malay Archipelago);
Proc. Zool. Soc. London, 1899, p. 163 (Kuatun, Prov. Fokien, China).—
Boettger, Ber. Senckenberg. Naturf. Ges., 1894, p. 132 (Hainan); Kat. Schl. Mus. Senckenberg., 1898, p. 22 (India, China, and Japan).—
Wall, Proc. Zool. Soc. London, 1903, p. 86 (Hongkong).

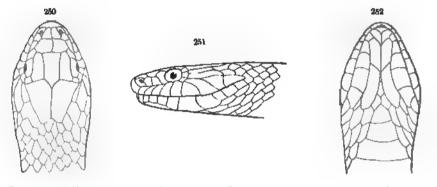
1837. Tropidonolus quincunciatus Schlegel, Phys. Serp., II, p. 307, pl. xii, figs. 4-5 (part. type-locality, Java) —Jan, Icon. Ophid., livr. 27, 1868, pl. 1, figs. 1-2 (Bengal). Boettger, Offenbach. Ver. Naturk. 24-25 Ber., 1885, p. 150. (China); 26-28 Ber., 1888 (p. 76).

p. 150. (Online), 20-20 Der , 1666 (p. 16).

1860. Amphiesma flavipunctatum Hallowell, Proc. Phila. Acad., 1860, p. 503 (type-locality, Canton River, China; type in Phila. Acad.; cotype U. S. Nat. Mus. No. 7387; Hongkong; Brooke, collector).

A large number of synonyms, many based on the various plates in Russell's "Indian Serpents," are here purposely omitted.

Description (figs. 250-252). Adult female; U.S.N.M. No. 36511; Sci. Coll. Tokyo, No. 13; Taipa, Formosa; September, 1897; T.



Figs, 250-252.—Natrix piscator. 14 - rat. size - 250, top of head, 251, side of head - 252, underside of head - No. 95, Sci. Coll. Tokyo

Tada, collector. Rostral much broader than high, visible from above; internasals much narrowed anteriorly, their sutures with the rostral scarcely more than one-half the suture of the latter with the first supralabial; prefrontals broadly in contact with supraoculars; frontal, with almost parallel sides, longer than its distance from tip of snout, and slightly longer than the interparietal suture; parietals longer than the distance of eye from tip of snout; nostril small, semi-lunar, in the upper posterior corner of the anterior nasal; loreal higher

a Signifying a fisherman. The masculine form is retained notwithstanding the fact that Natrix is of the feminine gender, in analogy with the usage of Luniaus himself in writing Coluber natrix, a usage followed by all subsequent writers (Tropidonotus natrix). A similar case is Agkistrodon contortrix.

than long, upper edge considerably shorter than lower; one preocular widely separated from frontal; eye rather small; three postoculars; 2+2 temporals, the upper one of the second row fusing with the one behind it so as to form a large irregular shield bordering the parietal laterally, 9 supralabials, fourth and fifth entering eye, seventh and eighth largest; five lower labials in contact with anterior pair of chinshields, which are much shorter than posterior; 19 rows of scales. without pores, rather feebly keeled, the two outer rows smooth: 140 ventrals; anal divided; 74 pairs of subcaudals. Color (in alcohol) pale tawny-olive, with numerous small black spots in four, alternating, longitudinal rows, the lower ones on the third and fourth scale rows largest and most distinct anteriorly; head nearly uniform above, with a pale black-edged oval spot on the posterior end of the interparietal suture and the scale immediately behind; a similar but smaller dot on each side of the interparietal suture near the frontal; sides of head pale, the anterior supralabials without black margins; a sharply defined narrow black line from the lower edge of the eve obliquely backward following the suture between sixth and seventh supralabials to the commissure, a similar line from the upper postocular parallel with the other across temporals and eight supralabials to the lip, which it crosses where the suture between eighth and ninth supralabials join the commissure; the broad band between these black lines lighter and somewhat yellower than the rest of the head; back of the angle of mouth a similarly colored crescentic nuchal band interruptedly outlined by black, lower side pale, ventrals and subcaudals narrowly margined with blackish.

Dimensions	
Total length	. 673
Snout to vent	497 176

Specimens of this species measuring 1,200 mm, are on record.

The young (U.S.N.M. No. 34051) slightly more than 150 mm, long, is colored essentially as the adult described above, only the pattern is more definite, the spots larger, especially those on the sides which descend to the ventrals and join their blackish margins; there is also a median dorsal row of spots which has become obsolete in the adult, so that the back is regularly checkered; the contrast between the light color of the postocular band and the rest of the sides of the head is very marked.

Variation. The six Formosan specimens examined by me show great constancy in the scale formula, as all have 19 scale rows, 9 supralabials, 2 + 2 temporals (one has 3 + 2 on one side), and one preocular. Four have 3 postoculars on both sides, one has 3 on one

side and 4 on the other, and one has 4 on both sides; the ventrals vary between 139 and 144, the subcaudals between 72 and 77 pairs. Boulenger notes the occurrence of 2+3 temporals, rarely 1+2; ventrals, 125-150; and subcaudals, 70-90. I may add here that Hallowell's cotype of Amphiesma flavipunctatum, from Hongkong (U.S. N.M. No. 7387) has the following scale formula:

sc. 19; v. 126; a 2; c. 85; l. 9; t. 2+2; oc. 1-3.

Doctor Wall, also in Hongkong specimens, found 5 postoculars on one side in one, and four on both sides in another; one had 8 supralabials on both sides, fourth only touching the eye.

The range of variation in coloration is very considerable, viz, from nearly uniform dark with small white spots, due to the great size of the blackish spots, to nearly uniform pale drab without any black markings whatsoever. Two specimens from Formosa (No. 16 a, Sci. Coll. and No. 36512 U.S.N.M.) show the latter peculiarity and in every respect agree with the Himalayan specimens, which have been called *Tropidonotus sanctijohannis.*^a

Habitat.—The known range of this species embraces the whole of southeastern Asia from India to the Malay peninsula and archipelago, as well as Hainan and southern China as far north as Fokien.

Its occurrence in Formosa was first discovered by Mr. Tada, who collected five specimens at Taipa in November, 1897, as previously recorded by me.

In the collection recently acquired by the U. S. National Museum from Mr. A. Owston, there is a very young N. piscator (U.S.N.M. No. 34051) the label of which indicated that it has been collected at Mount Fuji. Here is undoubtedly a mistake, and it appears quite certain that the specimen in question has become confused with the four specimens of Takydromus tachydromoides (U.S.N.M. Nos. 34179-34183) said to have come from northern Formosa. This suggestion is corroborated by the fact that the latter, although said to have been collected on June 23, 1903, look as if they had been preserved for a much longer period, while the Natrix, which is alleged to date from August, 1898, is quite fresh. I therefore conclude that the latter was collected in northern Formosa June 23, 1903. (See p. 243.)

^aBoulenger, Cat. Snakes Brit. Mus., I, p. 230, pl. xv, fig. 1.

List of specimens of Natrix piscator

Temporats Suprahibuta
2+2 9
2-3+2 9
2+2 9
2+2 9
2+2 9
2+2 P
2+2; 西

Type of A flampunctatum b Description p. 288. c Sci. Coll. Tokyo No. 16 b. d Figs. 250-252.

NATRIX ANNULARIS a (Hallowell)

1856. Tropidonotus annularis Hallowell, Proc. Phila. Acad., 1856, p. 151 (typelocality). Ningpo, China; type in Mus. Phila. Acad., Doctor McCartee, coll., —Swindde, Ann. Mag. Nat. Hist. (3), XII, 1863, p. 225., Tamsul, Formosa. Guenther, Rept. Brit. India, 1864, p. 261. Ningpo, Chikiang, Formosa. Ann. Mag. Nat. Hist. (6), I, 1888 (p. 171). (Mis. N. of Kukiang). Bollenger, Cat. Snakes. Brit. Mus. I. 1893, p. 233. China, Formosa. — Boettger. Ber. Schekenberg. Naturf. Ges., 1894, p. 146. (Chinhai, near Ningpo). Wall, Proc. Zool. Soc. London, 1903, p. 86. (Yangise Valley).

1859 Tropidonolus chinensis Berthold, Nachrichten Ges. Wiss Goettingen, 1859, p. 180 (type-locality China, type in Goettingen Mus.)

A nearly related form has recently been described by Doctor Werner as Natrix habereri b from the Ningpo Mountains, near Shanghai. It has practically the same scale formula as N. annularis (viz. 163-164 ventrals and 53-65 pairs of subcaudals), but the three outer scale rows are said to be smooth and the eye larger; the keels on the scales are not so strong. Above plumbeous, below red; markings as in N annularis. Boulenger regards them as identical.

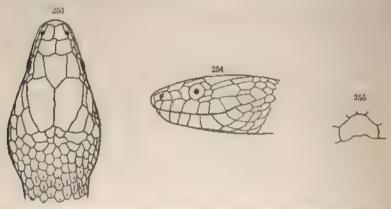
Description.—Adult male: U.S.N.M. No. 34044; northern Formosa, May 25, 1903; A. Owston, collector (figs. 253-255). Rostral much wider than high, just visible from above; internasals narrow, espe-

a Signifying with small rings, referring to ventral black half-rings

b Tropidonotus habereri Werner, Abh. Bayer. Akad. Wiss. (Muenchen), Η Klass-XXII, Pt. 2, 1904. p. 354. pl. r. figs. 1.2. type-locality. Ningpo. Mts., near. Shanghatypes in Mus. Munich, Doctor Haberer, collector).

c Zool. Rec., 1903, Rept. p. 24.

cially in front, their suture with the rostral being shorter than that of the latter with first supralabial; prefrontals broadly in contact with supraoculars; frontal shorter than its distance from tip of shout, scarcely equaling the interprefrontal suture, with nearly parallel sides; supraoculars narrow, scarcely more than half as wide as frontal, parietals much longer than distance of eye from tip of shout, as long as frontal and prefrontals together; nostril small, round behind the middle and near the upper edge of the hasal which is only divided into two unequal parts below the nostril; loreal nearly rectangular, slightly longer than high; one preocular, widely separated from frontal; eye small; three postoculars, the lower one almost horizontal; temporal 2+3, those of the first row very long and the upper especially very narrow, eight supralabials, fourth entering eye; five lower labials in contact with anterior pair of chin-shields, which are considerably



Figs 253–255 – Natrix annularis $2 \times$ nat size 253, top of head, 254 side of head (34)× nat size) 255 rostbal from front. No 34044, U.S.N.M.

shorter than posterior, chin-shields and labials studded with numerous small, rounded tubercles; 19 rows of scales, with two somewhat obscure apical pits, striated and strongly keeled, except outer row, which is feebly keeled, 163 ventrals; anal divided; 61 pairs of subcaudals. Color (in alcohol) on back dark grayish drab with ill-defined black reticulations or series of small ill-defined, alternating black spots; sides gradually much paler toward the ventrals, with numerous vertical black bars about two scales wide and two scales apart, the bars continued on the ventrals joining the corresponding ones of the other side as half-rings or alternating with them; scales included in black lateral bars with pale centers; shields on head obscurely outlined with dusky; labials whitish, with blackish sutures both on upper and lower lip, except on suture between fifth and sixth supralabials; an obscure, oblique blackish postocular streak; lower parts pale vinaceous-cinnamon, with black half-rings.

	Dimensions	
		स्राह्म
Total length		517
Snout to vent		415
Vent to tro of tail.		 . 102

Boulenger records a specimen of this species measuring 820 mm. in total length.

The young (U.S.N.M. No. 34049; Formosa), total length 212 mm., tail 42 mm, is quite like the adult, only darker with more sharply defined pattern on sides and abdomen; four outer scale rows on each side as light as underside.

Variation. The number of supralabials varies between 8 and 9, and the one entering the eye is the fourth or the fifth accordingly. Boulenger states that two supralabials rarely enter the eye. There is occasionally only a single anterior temporal. Ventrals vary between 145 and 163 (in twelve specimens), subcaudals between 53 and 69 pairs (in 8 specimens).

Habitat.—Restricted apparently to Formosa and southeastern China, where it has been found as far north as Ningpo and in the Yangtse Valley as far west as Kiukiang.

In Formosa it has been collected by Swinhoe, whose specimens are in British Museum. The United States National Museum also has two specimens from northern Formosa obtained recently from Mr. A. Owston.

Lust of specimens of Natrix annularis

Museum	No	Sex and age	Locality	When col- lected	By whom col- lected or from whom received	Scale rows	l entraia	Anal.	Sulcaudala	Oeulars	Temporats	Supreshebtule
				1903								
USNM	34044	Malea	Northern For	May 25	A Owston	19	163	2	ßI	1,3	2 8	3 8
			пова									
Do.	34049	Young	do	July 10	do	19	149	2	53	1,3	9+	3 9
Brit Mas	Ø	Female a	Formosa		R Swinhoe	19	147	2.				
Do	h	do.0	do		do	19	153	21	54			
	и Оизи	ription o	291 figs 253-2/	5.5.	*Bou	de mê	or C	at I	P :	233.		

NATRIX SWINHONIS & (Guenther).

1868 Tropiconotus swinhous Guenther, Ann Mag Nat Hist (4), I, 1868 p. 420, pl. xix fig. Fb., type-locality. Formosa type in Brit. Mus. R. Swinhoe, collector, Boulenoer, Cat. Snakes Brit. Mus. I. 1893 p. 218 (Formosa).

1888 Tropulomotus swinhou BOETTGER, Offenbach Ver Naturk 26-28 Ber , p 137 cemendation

^a For Robert Swinhoe, who collected the type | see p | 184.

b See this work, fig. 256

Only the type specimen of this species being known, the description by Boulenger is here reproduced

Description of type specimen. Adult female; British Museum; Formosa; R. Swinhoe, collector (fig. 256). Head narrow and elongate; eye moderate; rostral broader than deep, just visible from above, internasals a little broader than long, shorter than the prefrontals; frontal once and a half as long as broad, as long as its distance from the end



FIG 256. NATRIX SWINIONIS FULARIED SIDE OF HEAD COLY FROM OPENTHER, AND MAG NAT HIST (4), I, 1968, PL XIX, FIG P

Total length

Tail [defective] about

of the snout, shorter than the parietals; loreal as long as deep; one preocular and three postoculars; temporals 1+2; 6 supralabials, third and fourth entering eye, fifth very long; 4 lower labials in contact with the anterior chin-shields which are shorter

than the posterior; scales strongly keeled, of outer row faintly keeled, in 15 rows; ventrals 150; anal divided; subcaudals circa 50. Brown above, anteriorly with irregular blackish spots, occiput and nape reddish, with a broad black collar; a black spot below the eye, and an oblique black band on the temporal region; lower parts yellowish, powdered with brown on the sides.

Dime	ensions.	
		TATA.
		 580

Habitat.—This species is described from Formosa. Only a single specimen is known, the type, collected by R. Swinhoe, being in the British Museum.

Remarks.—The nearest relative of this species appears to be Natrix nuchalis described in 1891 by Boulenger from specimens in the British Museum, collected by A. E. Pratt at Ichang, on the upper Yangtse. The scale formula is the same, but N. nuchalis has the scales very feebly keeled, a shorter head, and a very distinct groove along the middle of the back.

Genus ACHALINUS Peters.

1869 tchalmus Peters Mon Ber Berlin Akad Wiss, 1869, p. 436 type, A. spinalis

1877 Ophidaps Sat vang, Bull Soc. Philom Paris 7), I p 108 type, O. braconnect

The statement that this genus has no postoculars is scarcely quite correct. It is true that in some of the young specimens no such shield can be detected, but in our large specimen, No 34046, there is

[&]quot;Ann Mag Nat Hist C, VII p 281

b From a, without xaliros, poison fang.

plainly a small triangular, or rather semilunar, scute behind the eye fitting into the blunt angle between the anterior temporals. A similar scute is also discernible in the young specimen No. 34047.

Thus far the genus has only been recorded from southern China and Japan. Its nearest relatives seem to be found in Ceylon and the Malay islands. However, specimens are as yet rare and it has been but recently discovered, so that it is not safe to draw any conclusions from its distribution and relationship as known at present.

Boulenger recognizes three species of this curious genus, viz. A. rufescensa and A. braconnierib, from southern China, and A. spinalis, from "Japan (?)." Of these, the first and the last were only known from one specimen each at the time the first volume of his catalogue was published (1893), while of A. braconnicri he had four specimens. A. rufescens, with its very long internasal suture and partly tricarinate scales may be regarded as unquestionably distinct. Additional specimens from Japan, however, show so much deviation from the type of A. spinalis and so much variability in the direction of A. braconnieri that it may become difficult to maintain the latter as a distinct species. The characters which are supposed to distinguish the two species break down one by one. A. braconniers was characterized as having 23 to 25 scale rows as against 21 in the type of A. spinalis, but five additional specimens from Japan seem to indicate that 23 is the normal number in the latter. Furthermore, in A braconnieri the suture between the internasals is said to be shorter than that between the prefrontals, while in the type of A spinglis these sutures are described as of equal length. This is also approximately the case in our specimen from Kiusia (U.S.N.M. No. 30731), but in the specimen in the Science College Museum, in Tokyo, also from Kiusiu, the interprefrontal suture is much longer, the one between the internasals being only 0.3 the length of the one between the prefrontals. In the two specimens from Mount Fuji (U.S.N.M. Nos. 34046-7) the relations are 0.4 and 0.6. Finally, A braconnier has

Garrian Borresson, Ann. Mag. Nat. Hist. 6: II 1888 p. 43. type locality Hongkong).
Cat. Sn. Brit. Mus. 1. 1893 p. 308 pl. xv. hg. 2. III, 1896 p. 612.

Ophiclaps beaconners Sata see Bull Soi Philom Paris, 77 1, 1877, p. 109 (type-locality, eastern Kiangsi China. Achalinus braconners Bot lenger, Cat. Sn. Brit. Mus. 1, 1893, p. 309, 111, 1895, p. 613.

c The ventrals of the type are given as 136 subcaudals 82 and Borlenger Cat Snakes Brit Mus. III 1896 p. 612 in another male specimen from Hongkong counts 137 ventrals and 76 caudals. This is greatly at variance with the number of scutes given by Doctor Wall for four Hongkong specimens, namely 150 + 56, 158 + 58, 158 + 61, and 154 + 58, respectively. In view of the apparent narrow limits of variation in this series as well as in A spinalis, I am at a loss how to explain the above discrepancy.

d Peters says. Die Praefrontalia sind nicht langer als die Internasalia. In the figure (bg. 1a., however, the prefrontal suture is considerably longer than the internasal suture. Which is correct?

two pairs of chin-shields, while the type of A. spinalis has three. But here, again, our specimen No. 30731 from Kiusiu steps in between as having only two, while the specimen in Tokyo and our two specimens from Fuji have three like the type.^a The slight difference in the number of ventrals and subcaudals is completely bridged over by the additional specimens. The coloration, on the other hand, is the only feature which thus far offers a character by which to distinguish the two forms. A. braconniert is described by Boulenger as being uniform blackish, the ventrals having a narrow whitish edge. The Japanese specimens all seem to have the median black dorsal line and often a blackish longitudinal median stripe on the underside of the tail, the latter being absent in No. 34047 and very obscure in No. 30731, which also shows trace of a dorso-lateral dusky line.

It may be that an actual comparison of specimens from Japan and China may demonstrate further differences, but it is quite clear that the Japanese species is very closely allied to the Ichang specimens collected by Mr Pratt and described by Boulenger.

Recently Doctor Wall* has come to a similar conclusion as to the probable identity of the two species. He examined three Japanese specimens, which all had 23 scale rows, viz, the two specimens now in the U.S. National Museum alluded to above (Nos. 34046, 34047), and a third one from the same locality. Unfortunately he does not mention the coloration nor the number of chin-shields in the third specimen. It is also impossible to make out which of the scale formulas given belong to the the third Japanese specimen.

Whether, on the other hand, the Ichang specimens are identical with Sauvage's originals of A. braconnieri from eastern Kiangsi is another question. His description is certainly very different from Boulenger's. Thus he speaks of the temporals as being numerous; of the prefrontals as small; his specimens have a small lower postocular, and the number of labials he states to be eight; the color, moreover, is a "brun ardoise uniforme."

o I may here call attention to the fact that in Boulenger's figure of 1 infesces (Cat Sn. Brit. Mus., 1, 1893, p. 308, pl. xx. fig. 2, there is only indicated two pairs of chinshields, while the description speaks of three. This figure also shows only five supralabials as against six in the description.

b It may be well to peint out a difference in the dental formula of the genus and the dentition as I find it in the specimen in the Science College specimen, Tokyo, and in our No 34046. In these I count 14-16 maxillary teeth which are subsequal, the first three and the last three slightly smaller, while Boulenger for the genus says. "Maxillary teeth 22 to 25 small, equal. Is this character derived from I chang specimens, and have we here a possible difference in the two forms?"

Proc Zool, Soc London 1903 p. 88.

d I presume that his scale formulas 165 + 44 and 165 + 48 are meant for our specimens No. 34047 and 34046, respectively—Repeated counts of these specimens give 163 + 45 and 165 + 49.

ACHALINUS SPINALIS Peters.

1869. Achalinus spinalis Peters, Mon. Ber. Berlin Akad. Wiss., 1869, p. 436, pl. , fig. 1 (type-locality unknown).—Boulenges, Cat Sa Brit. Mus., 1, p. 309 (Japan') Namiye Annot. Zool Japon , H. Pt. 1, 1898, p. 29, fig. (Kiusiu). Boettger, Kat. Schl. Mus. Senckenberg, 1898, p. 33 (Hakone Mts.). Walit, Proc. Zool. Soc. London, 1903, pp. 88, 100 (Mt. Fuji).

Description (figs. 257-259). Adult female; U.S.N.M. No. 34046; Mount Fuji, Hondo; August, 1898; A. Owston, collector. Rostral scarcely visible from above, wider than high, and so much hollowed out below that the surface laterally is represented as a ridge only; internasals very small, narrow anteriorly, the suture with rostral less than half that of the latter with anterior nasal; prefrontals very large, the suture between them twice as long as the one between the internasals, broadly in contact with supraoculars, and with second supralabial; frontal pentagonal, straight anteriorly, posterior angle acute,



Figs 257-250 ACHALINUS SPINALIS 21 : NAT SIZE 247 FOR OF HEAD 258, SIDE OF HEAD, 259, UNDERSIDE OF HEAD NO 30731 US N.M.

as wide as long, shorter than distance from tip of snout, scarcely one-half as long as parietals; supraoculars very small, their width less than one-fourth that of the frontal, parietals exceedingly large, twice as long as distance of eye from tip of snout, pointed posteriorly; nostril large, horizontally oval in the anterior of two nostrils which are deeply hollowed out; loreal longer than high, entering eye and in contact with prefrontal and supraocular but not with posterior nasal; no preocular; eye very small, smaller than loreal; a crescentic trace of a postocular in angle between two anterior temporals; 2+2 temporals, upper anterior smaller than the others, in contact with supraocular; a large, elongate shield bordering the posterior half of the parietals; six supralabials, first exceedingly small, sixth exceedingly large, as large as the other five together, fourth and fifth entering eye; mental deeply hollowed out, the surface forming a V-shaped ridge; 3 lower labials in contact with anterior chin-shields, which together

[&]quot; Pertaining to the spine or backbone, referring to the black line along the middle of the back.

form a heart-shaped figure; 3 pairs of chin-shields, posterior shortest; 23 rows of small, nonimbricate, convex and keeled scales without apical pits, the soft skin mostly visible between the scales; 165 ventrals; analentire; 49 undivided subcaudals. Color (in alcohol) above uniform "walnut-brown," more rufous toward the middle of back, with a very distinct black longitudinal stripe along the median line involving the median scale row and the adjacent half of the scale on either side; underside paler, more cinnamon colored, each scute with a narrow light edge and a darker submarginal line; a median dusky stripe on the underside of the tail.

Dimensions.	
	179 271.
Total length	412
Snout to vent	347
Vent to tip of ten	85

The male seems to have a relatively longer tail with more subcaudals. Thus the specimen in the Science College Museum, Tokyo, measures 410 mm. in total length, of which the tail is 90 mm. and contains 61 subcaudals.

The young is darker above in stronger contrast to the underside and seems to lack the dark median stripe on the underside of the tail.

Variation. Only a few specimens are in the museums, but these show considerable variability. The six of which the individual scale formulas are recorded, agree in having 6 supralabials; no preoculars and no postoculars (except occasionally a trace): 2+2 elongated temporals, the scale rows vary between 21 and 23, six being known with 23 and only one, the type, with 21; ventrals between 146 and 166; subcaudals between 45 and 62; all have an undivided anal and undivided subcaudals. The specimen described above seems to be unusual in having the loreal separated from the posterior nasal by the prefrontal touching the second supralabial. The specimen figured (fig. 259) is also abnormal in possessing only two pairs of chin-shields. The Tokyo museum specimen shows a curious and rare anomaly in having the frontal divided longitudinally by a suture, and it is interesting to note that one of Sauvage's types of his A. braconnieri, from China, also has the frontal divided (though he does not say whether longitudinally or transversely); this specimen also has one of the supraoculars divided.

Habitat. Under the supposition that A. braconnicri, which is recorded from eastern Kiangsi and from Ichang, in southern China, represents a distinct form, the present species is restricted to Japan.

Thus far only ten specimens are known, seven of which are from definite localities, which throw some light on the distribution of the species. Of these three are from Kusiu, viz, the two which Mr. N. Takachiho collected at Hikosan, province of Buzen, near the northern

extremity of the island, and a fine specimen sent our museum by Rev. Cyrus A. Clark from Miyazaki, toward the southern end of the same island. The one in Museum Senckenbergianum in Frankfort on the Main, which was obtained from Mr B. Schmacker in 1889 came from the Hakone Mountains in Hondo, and Doctor Wall mentions three specimens in Owston's collection from "Mount Fuji." Two of the latter are now in the United States National Museum (Nos. 34046, 34047).

List of specimens of Achalinus spinalis

Museum	No.	Sex and age.	Locality.	When collected	By whom col- iceted or from whom re- ceived	Scale tows	Ventrala.	Anal	Subcaudals.	Oculars. Temporals.	Supridabals	Chin shields
USN M	30731	Young a	Miyazaki Hiu- ga Kiusin	1898.	C. A. Clark.	23	166	- 1	57	0,02+2	6	2
Do.	34046	Female 8	Mount Fujt Hondo	Aug -	A Owston	23	165	,	40	0,02+2	1	3
Do Berlin	34047	Young	do Јарап ⁷	do .	do		163	1		0,02+2 0,02+2	6. U	3
Set Coll Tokyo		Mate d	Hikosan Bu- zen, Kiusiu	3 une	N Takachiho.		503			0.0(2+2	6	3
Takachi ho.		(e	do		do	23	1681		51			
Owston		′	Mount Fuji, Hondo	,		23						
		5. 257 259			stera p 436.					е. р. 20.		
	b Des	cription, p	297	d Frontal	livided			1.33	ull,	p RR.		

Subfamily HOMALOPSINÆ,

The snakes of this group are apparently closely allied to the Natricine snakes, differing chiefly in the presence of grooved fangs at the posterior end of the maxillary. They are even more thoroughly aquatic, having the nostrils on the upper surface of the snout and provided with valves by means of which they can be closed. The head is usually small and thick, scarcely distinct from neck, and the eyes are small mostly with a vertically elliptic pupil; very often there is only a single internasal shield.

The Homalopsine snakes are confined to southeastern Asia, including India, the Malay Archipelago, Philippines and southern China, New Guinea, and northern Australia. Two genera occur within our limits, inasmuch as two species of the genus Enhydris and one of Hurria have been recorded from Formosa.

The two genera may be distinguished as follows:

Genus ENHYDRIS" Latreille

1802. Enhydris Latriciae Hist Nat Rept., IV. p. 200 type, E. carrilea... Hydrus enhydris Schneuler (not of Merreni 1820).

1830 Hypsirhina Wagter, Syst. Amphib., p. 169 (type, H. aer).

1842 Fermin Gray Zool Miscell., p. 67 ctype, H. sicholdro

1843. Hypsiseopus Fitzinger, Syst. Rept., p. 25 (type, H plumber).

1843 Pythomorphus Frezingen, Syst. Rept., p. 25 (type, H. sicholdu), 1853 Eurostus Di Mérit, Prodroni Class Ophid, p. 102 (type, E. dussumiern)

1853 Trigonorus Di MÉRIG, Prodrom Class Ophid, p. 103 (type, H. sicholdi).

The authors who employ the generic name, 'Enhydris, Merrem, 1820," for two of the Hydrid snakes which should correctly stand as Lapemis, seem to have overlooked entirely the fact that Latreille, as early as 1802, established the genus Enhydris for an entirely different set of snakes, embracing all Schneider's species of Hydrus, from H. caspius on. This name, which can not be discarded, as it is not a synonym of any name previously given, must have for type one of the six species enumerated by Latreille, and as neither he nor any of his successors have designated a type for the name, we are obliged to resort to the method of elimination. The last species mentioned by Latreille, Enhydris dorsalis, is of dubious application. The third, Enhydris runchops, is the type of Daudin's Hurria (1803), Goldfusz' Strephon (1820), and Cuvier's Cerberus (1829), while three other species, viz, E. caspius, piscator, and palustris belong to the genus Natrix (Tropidonotus). A single species is thus left as type, viz, Enhydres carulca, which is Schneider's Hydrus enhydris. This species, or rather a synonym of this species, was afterwards (1830) made the type of Hypsirkina, and there can be no doubt but that the latter name will have to give way to Enhydris Latreille. The same result is obtained by those who would fix the type by employing the "principle of tautonymy."

Two species have been recorded as occurring in Formosa and for that reason are here included. They may be distinguished as follows:

a¹ Scales in 19 rows, supralabials 8 - ventrals less than 150
 E plumbia, p 300.
 a² Scales in 24 rows, supralabials 7, ventrals more than 150
 E bennetto p 302

ENHYDRIS PLUMBEA & Boies.

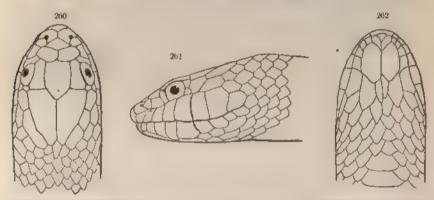
1827 Homolopsis plumbea Boir Isis, 1827 p. 550 type-locality, Javan Hypsichina plumbea Gray Zool Mise, 1842, p. 66. Glenther Rept. Brit India 1864 p. 280 Java to Formosa. Jan Icon Ophio, livr. 30, 1868 pl. v. 1932, 2.3. Java. Boetroer, Offenbach Ver Naturk. 24-25. Ber. 1885, pp. 123-151. China. Ber. Senckenberg Naturf. Ges., 1894, p. 134. Haman. Boi lenger. Cat. Snakes Brit. Mus., 111-1896, p. 5. (Formosa, China. Siana. Malay Peninsida. Java., Walt. Proc. Zool.

[&]quot; From expelors a water snake

b Signifying lead-colored

Soc London 1903, p. 94 (Hongkong) Enhydris plumber Steineger, Journ Sci Coll Tokyo, XII Pt. 3, 1898, p. 222 Taipa, Formosa 1834 Hypsi hina hardwicku Gray, III Ind. Zool , II (pl. exxxvii, fig. 1) (typelocality. Pinang, type in Brit. Mus.)

Description. - Adult finale: Science College Museum, Tokyo, No.11a; Taipa, Formosa; November, 1897; T. Tada, collector (figs. 260-262). Rostral much broader than high, just visible from above; internasal single, twice as wide as long, separated widely from rostral by nasals, separated from loreal, prefrontals broader than long, broadly in contact with supraocular; frontal longer than its distance from tip of snout, equaling interparietal suture, nearly straight anteriorly, sides parallel, twice as wide as supraocular at center of eye; parietals as long as their distance from rostral, rather narrow posteriorly; nostrils small, round, on upper surface of snout, in the posterior margin of the anterior nostrils which are broadly in contact behind the rostral; posterior nasal less than half the size of the anterior, smaller than



Figs 260-262. -Enhydris Lumber $-2 \times Nat$ size -260, top of head, 261 side of head -No 1.4 Sci Coll Toryo

loreal, which is slightly longer than high; eye small, its diameter less than its distance from edge of lip; one preocular, not in contact with frontal; two postoculars; temporals 1 + 2; % supralabials, increasing in height backward to the seventh, which is largest, and much higher than eight, first in contact with loreal, separating posterior nasal from second supralabial, fourth and fifth entering eye; five lower labials in contact with anterior chan-shields; posterior chin-shields slightly shorter than anterior, separated from each other by two scales, 19 rows of smooth scales without apical pits; 130 ventrals; anal divided; 31 pairs of subcaudals. Color (in alcohol) above uniform slate gray; labials and two outer scale rows whitish with gray edges; underside whitish, each scute with lateral edge and base narrowly margined with dark gray and with a median basal spot of the same color; on anal shield and the underside of the tail a sharply defined median line of dark gray.

Dimensions.	
	MM.
Total length	430
Snout to vent	382
Vent to tip of tail	48

Variation.—Few deviations from the specimens described above are recorded. In the other specimen from the same locality the posterior nasal is in contact with second supralabial. Sometimes only the fourth supralabial enters the eye. The number of ventrals varies between 120 and 134, subcaudals between 29 and 46. Coloration is also rather constant; a median dorsal series of small black spots may be present and the whole underside may be unspotted.

Habitat.—Originally described from the Malay Archipelago this species has since been found on the opposite mainland from Burma to southern China. It occurs in Formosa, there being two specimens in British Museum collected by R. Swinhoe, and two specimens were collected by Tsunasuke Tada in 1897 at Taipa.

List of specimens of Enhydris plumbea.

Museum. No. Sex. Locality.	When collected.	By whom collected	Beate rows.	Ventrals.	Anal	Subcandula.	Oeulars.	Temporals Supralablais.
U.S.N M 36513 Male Taipa, Formosa Sci. Coll	1897. Nov —,	T Tada	19	126	2		1,21	+2. 8
Tokyo 11 a Female bdo	do .	do	19	130	2	31	1,21	+2 8
Brit Mus. (a) Male c Formosa		R. Swinhoe .	19	128	2	40		
Do (b) Female do		do	19	129	2	33.		
• Sci. Coll Tekyo, no 11b b Description	p. 301, fi	gs. 260-262	r B	oule	neer.	, Cat	, III	. D. 5.

ENHYDRIS BENNETTII a (Gray).

- 1842. Hypsirhina bennettii Gray, Zool. Miscell., p. 67 (type-locality, China; type in Brit. Mus; Bennett, collector) —Guenther, Rept. Brit. India, 1864, p. 283 (China) —W. L. Sclater, List Sn. Ind. Mus., 1891, p. 55 (Formosa).
- 1885. Hypsirhina bennetti Boettoer, Offenbach Ver. Naturk. 24 and 25 Ber., p. 151 (China), Ber. Senckenberg Naturf Ges., 1894, p. 134 (Hainan); Kat. Schl. Mus. Senckenberg, 1898, p. 88 (Hainan, Herz, collector).—Boulenger, Cat. Su. Brit. Mus., 111, 1896, p. 8 (China)
- 1854. Hyperhina maculata Duméril and Bibros, Erpét Gén., VII. Pt. 2, p. 950 (type-locality, China; type in Paris Mus., Eydoux, collector)
- 1868 Hypsirhina enhydris var, maculata Jan, Icon Ophid, livr 30, pl. tv, fig. 1.

No specimen from Formosa being accessible to me, I describe one which probably hails from the mainland opposite.

Description. - Male; U.S.N.M. No. 22128; Hongkong, China?; Dale and Jouy, collectors (figs. 263-265). Rostral somewhat broader

a Named after G. Bennett, esq., who collected the type

than high, visible from above; internasal single, widely separated from rostral by nasals, small, not much broader than long, widely separated from loreal; prefrontals smaller than nasals, in contact with them and with supraoculars; frontal somewhat shorter than its distance from tip of snout, nearly twice as wide as supraoculars at center of eye; parietals rather broad, the lateral outline irregular and showing evidence of fusion with adjacent scales, nostrils semilunar, on top of snout, in a large nasal which on the left side is semidivided by a suture from nostril to first labial; nasals broadly in contact with each other behind rostral with prefrontals and first supralabials; loreal trapezoid, longer than high, in contact with first three supralabials; one preocular, not in contact with frontal; eye small, its diameter less than distance from edge of lip; two postoculars; 1+2 temporals; 8 supralabials, increasing in height backward to the sixth, which is highest, first in contact with loreal, thus exclud-



Figs. 263-265. Eshiydris bennettl. $2 \times$ sat size 263, top of bead, 264, side of head, 295, underside of head - No 22128 + 0.008 + 0.008.

ing nasal from second, fourth entering eye; three lower labials in contact with anterior chin-shields, which are followed by two pairs of smaller chinshields, both separated by scales; 21 rows of smooth scales without pits; 164 ventrals; anal divided; 64 subcaudals. Color (in alcohol) above drab gray, with two series of irregular dark brownish gray dorsal spots, which anteriorly unite into short crossbars and on the neck to a median longitudinal dark band; outer four scale rows white, the first and fourth having their lower and upper edge respectively margined with dark gray, forming an upper and lower dark indented edge to the lateral white band; labials and whole underside whitish, each scale and scute edged with dark gray, the ventrals with a median series of dark spots formed by a projection of the dark basal edge, and a similar arrangement on the subcaudals, causing a zigzag longitudinal dark band on the median line of the underside of the tail.

Ι.

Dimensions.

	##.
Total length	377
Snout to vent	
Vent to tip of tail	63

Variation.—In the few specimens of this species recorded the number of ventrals varies between 158 and 164, subcaudals between 47 and 54.

Habitat.—Apparently restricted to China. The authority for the the occurrence of this species in Formosa is a specimen in the Indian Museum (No. 12693) recorded by Mr. W. L. Sclater (l. c.). It was received from the Hongkong Museum in exchange.

List of specimens of Enhydris bennettii.

US. N.M. No.	Sex.	Locality.	When col- lected.	By whom collected.	Scale rows.	Ventrals.	Anat	Subcaudals.	Oculars.	Temporala.	Supratablate.
22128	Male a	Hongkong !		Dale and Jouy	21	164	2		1,2	1+2	8.

Description, p. 302; figs. 263-265.

Genus HURRIA a Daudin.

- 1803. Hurria Daudin, Bull. Soc. Philom. Paris, III, no. 72, March, 1803, p. 187 (type, Hydrus rynchops).
- 1813. Huria Fischer, Zoognosia, 3 ed., I, p. 65 (emendation).
- 1815. Hurrianus RAFINESQUE, Anal. Nat., p. 77 (emendation).
- 1820. Strephon Goldfusz, Handb. Zool., II, p. 151 (substitute for Hurria).
- 1829. Cerberus Cuvier, Régne Anim., 2 ed., II, p. 81 (type, Coluber cerberus).
- 1839. Cerebus Swainson, Classif. Fish Amph. Rept., II (Lardner's Cab. Encycl.), p. 366 (lapsus).

The name Cerberus, by which this genus is generally known, must give way to Hurria of Daudin, 1803, the exclusive type of which is Russell's, Indian Serpents, pl. xL, which Doctor Boulenger identifies as H. rynchops.

HURRIA RYNCHOPS b (Schneider).

- 1799. Hydrus rynchops SCHNEIDER, Hist. Amphib., I. p. 246 (based on Russell, Ind. Serp., I, pl. xvii; type-locality, Ganjam).
- 1801. Elaps boacforms Schneider, Hist. Amphib., H, p 301 (type-locality not given, type in Mus. Univers. Halle)
- 1802. Hydrus concreus Shaw, Gen. Zool., HI, Pt.2, p. 567 (based on Russell, pl. xvn).
- 1803. Hurra schneideriana Dat DIN, Hist. Nat. Rept., V, p. 281 (substitute name for Elaus boaeformis Schneider)
- 1803. Hurria bilincata Datidin, Hist. Nat. Rept., V, p. 284 (based on Russell, Ind. Serp., II, pl. xL; type-locality, Hyderabad).

^a From the Indian name Hurriah, by which Russell designated the snake which Daudin named Hurria bilineata.

From Rynchops, better rhynchops, from ρύγχος, snout, and ωψ, eye, or face.

1803. Coluber cerberus Daudin, Hist. Nat. Rept., VII, p. 167 chased on Russell, pl. xvii.

1820. Python elapiformis Merrem, Tent. Syst. Amph., p. 89 (substitute for Elaps boacformis Schneider).

1820. Python chynchops Merrem, Tent. Syst. Amph., p. 90 (emendation).

Cerberus chynchops Guenther, Rept. Brit. India, 1864, p. 270 (East Ind. archipelago, Ceylon, India, Malay peninsula, Siamo. Boulender, Cat. Snakes Brit. Mus., III, 1896, p. 16 (India, Malay peninsula and archipelago, Philippines, Pelew Islands.)

1826. Homalopsis molurus Bore, Isis, 1826 p. 213 (type-locality, Moluccas)

1837. Homalopsus schneideri Schi edel, Phys. Serp., I., p. 171. Pondichery, Bengal, Java, Timor, Amboina, New Guinea II, p. 341 (schneideri)

1837. Coluber obtasatas Reinwardt, in Schlegel, Phys. Serp., II. p. 341.

1837. Cerberus russela Cuvier, in Schlegel, Phys. Serp., II, p. 342, footnote (Pondichery).

1849. Cerberus neutus Gray, Cat. Snakes Brit. Mus., p. 65 (type-locality, Borneo, type in Brit. Mus.).

1849. Cerberus anicolor Gray, Cat. Snakes Brit. Mus., p. 65 (type-locality, Philippines, type in Brit. Mus. Cuming, collector)

Description Adult male, Christiania University Zoological Museum. No. 830; Formosa; Navara collector, 1894 Rostral pentagonal; the large semidivided nasals broadly in contact with each other behind the rostral; nostrils on upper side of snout; internasals small, triangular, separated widely from rostral, in contact with loreal; prefrontals smaller than nasals, in contact with internasals, loreal, prefrontal, supraocular, and frontal, frontal irregularly divided into four smaller scales; parietals broken up into small scales, supraoculars narrow; loreal lozenge-shaped; one high preocular; two suboculars separating eye from labials; one postocular, temporals 2+3, second row keeled; supralabials 10 on one side, 9 on the other, very high and narrow, the last three divided horizontally; 11 inferior labials, 4 in contact with anterior chin-shields; two pairs of chin-shields, the posterior nearly entirely lateral to the anterior, 25 scale rows, all keeled. except outer row; 145 ventrals; anal double; caudals, 63 pairs. Color (in alcohol) above ash gray with narrow blackish crossbands which do not reach the ventrals, about 25 between head and anus; a narrow blackish band from nostril, through eye, obliquely backward on the side of the neck; underside, including posterior supralabials and the three or four lower rows of scales whitish with numerous large blackish spots on the sides connected with the corresponding spot by irregular dark gray blotches across the ventrals; lower labials with a few small dusky spots.

Immensions.

Total length.		570
Shout to vent		447
Vent to tip of tail	* * * * * * * * * * * * * * * * * * * *	123

Variation.—The head scales of this species are subject to great variation. The frontal shield may be intact or broken up; eye may be surrounded by from four to six shields; internasals may be united. etc. The scale rows vary between 23 and 27, ventrals between 132 and 160, and subcaudals between 49-72.

Habitat.—This species lives in rivers and along the seacoasts of India east to Indo-China and the Philippines, and south to Ceylon and throughout the Malay countries and archipelago to Borneo. Celebes, Ceram, etc.

Its right to a place in this work is based upon a specimen collected in Formosa by Mr. Navara, and now in the zoological museum of the University of Christiania.

List of specimens of Hurria rynchops.

Museum	No.	Sex	Locality.	When col- lected.	By whom collected.	Scale rows.	Ventraís	Anul.	Subcaudala.	Ocuları.	Teurporada.	Supratablals
			-							-		
Christiania		Malea	Formosa	. 1894	Mr Navara.	25	145	2	63	1,2,1	2+3	9-10
_	1						_				1	

Description, p. 305.

Subfamily CORONELLINÆ.

The coronelline snakes embrace a great variety of forms of arboreal or terrestrial habits, and consequently of the most different physiognomy. Having no grooved fangs of any description, they are of course nonpoisonous, although a few, like the Dinodon, with their vertical pupil, to some extent resemble various poisonous forms. But apart from the absence of grooves on the posterior maxillary teeth there seems to be no character by which they can be distinguished from the next subfamily.

Most of our snakes belong to this group, the genera of which may be identified by the following:

KEY TO THE GENERA OF CORONELLINE SNAKES ENOWN PROM JAPAN AND ADJACENT TERRITORY.

- al Scale rows round body in even numbers......Zaocys, p. 352. a² Scale rows round body in uneven numbers
 - b) Anterior temporals present, separating parietals from supralabials.
 - cl Median maxillary teeth differentiated from the others by intervals; pupil yer- c^2 Median maxillary teeth not differentiated from the others; pupil round.

 - d^{1} Scales with apical pits, head distinct from neck.
 - e^2 One loreal only
 - ft Maxillary teeth increasing in size posteriorly, tail more than one-fourth of total lengthZamenis, p. 349.
 - f Maxillary teeth subequal, tail less than one-fourth of total length. Elaphe, p. 307.

d2 Scales without pits, head not, or scarcely, distinct from neck

et Maxillary teeth posteriorly strongly enlarged portion of rostral visible from above as great as its distance from frontal . Holorchus, p. 353

62 Maxillary teeth equal portion of rostral visible from above less than its
distance from frontal Liopelius, p. 337.

f² No anterior temporal, parietal being in contact with supralabials Calamaria, p. 375.

Genus ELAPHE" Fitzinger.

1826. Coluber Boie, Isis, 1826, p. 209 .type, C. flarescens, not of Linnaus

1833 Elaphe Fitzinger, in Wagler's Descr et Icon. Amphib, III text to pl xxvn (type, E parreysu)

1834. Callopeltis Firzinger, in Bonaparte's Iconogr Fauna Ital , fasc VII (type, C. leopardina).

1840. Elaphis Bonararte, Mem. Accad. Sci. Torino (2), II, Sci. Fis. Mat. p. 402 (emendation)

1843 Pantherophus Fitzinger, Syst Rept , p 25 (type Coluber guttatus)

1843 Culopeltis Fitzinger, Syst. Rept. p. 26 (emendation)

1853 Scotophis Bairo and Giraro, Cat. N. Am. Rept., I. Serp., p. 73 (type, Coluber alleghanicums)

1860 Leptophidium Hallowell, Proc Phila Acad, 1860, p. 497 (type, L. dorsale).

1860 Proterodon Hallowell, Proc. Phila Acad, 1860, p. 498 (type, P. tessel-latus).

1862 Natrix Core, Proc. Phila. Acad., 1862, p. 338 (type, Coluber Maiescens, not of Laurenti)

1864 Phyllophia Guenther, Rept. But India, p. 295 (type, P carinata

The above synonymy refers chiefly to such names as have been employed in connection with species treated of in this work

The generic name Coluber is commonly applied to this genus, but as will be shown under that heading further on, without strict observance of the rules of zoological nomenclature, inasmuch as the authors who have specifically selected types for a restricted genus Coluber have invariably selected species unknown to Linnæus at the time he instituted the genus. The first one to mention a specific type was Fleming, in 1822, but he selected a Python unknown to Linnæus. The next one was Boie, who again selected a post-Linnæan species, namely, Scopoli's C. flavescens.

^a This name is apparently a blunder for *Elaphis*—The latter is generally considered as derived from ελαφος, a deer, referring either to the coloring of the snake or to its swiftness. Aldrovandi, who seems to be the source whence the modern authors received the name, apparently considered it as of the same origin as *Elaps* and *Elops*. See Aldrovandi Serpentum et Draconum Historia, Chapter XV, "De Elaphe, sive Elape aut Elope"

b Isis, 1826, p. 209, and 1827, p. 518,

 a^{\dagger}

KEY TO JAPANESE, KOREAN, AND FORMOSAN SPECIES OF PLAPHE

Scale rows 19	E quadrivirgata, p. 327.
More than 19 scale rows	
b) Scale rows 21	
c ¹ Less than 195 ventrals	. E rufodorsata p 310
c' More than 195 ventrals	E conspicillata p 334
b. More than 21 scale rows	
c. One or two outer scale rows smooth, the others strongly	keeled
	E carinata, p 308
c2 More than two rows of scales smooth	
d ¹ More than 85 pairs of subcaudals	
e Underside of tail black with a very distinct whitish	hand slone the median
suture between the subcaudals	The state of the s
f! Scale rows, 23-25, ventrals, 229-258, subcaudals	90-111 mares
y beast some, and any transaction and the second	E tennurus p 319
f ² Scale rows 25-27; ventrals, 251-260, subcaudal	-
j Deste tone so all religion, nor and burnaven	E schmacker, p 322
e2 Underside of tail not longitudinally striped .	E chmacophorn, p 324
d ² Less than 85 pairs of subcaudals.	Z titmasupaina, p as4
·	obul material setum at a
e' Eleven to thirteen median scale rows distinctly ke	-
longer than distance of frontal from rostral, post	
commissure in front of angle of jaw, color un	
spots and light cross bands .	
e ² Scales smooth with only faint traces of keels on the	
suture longer than distance of frontal from nostr	
reaches commissure at angle of mouth, color ligh	ht with numerous marrow

ELAPHE CARINATAa (Guenther).

1858 Elaphis sauromates Guenther, Cat. Colubr. Sn. Brit. Mus., p. 93 (Ningpo, China) not of Pallas), Rept. Brit. India, 1864. p. 241 (part. Ningpo), pl. xxi, fig. E.

E. dione, p 315.

1864 Phyllophia carinata Guenther, Rept. Brit. India, p. 295, pl. xxi, fig. B (type-locality, China; type in Brit. Mus.); Ann. Mag. Nat. Hist. (6), I, 1888, p. 170 (Kiukiang) Elaphe carinata Steineger, Journ. Sci. Coll. Tokyo, XII.

Pt. 3, 1898, p. 221 (Formosa)

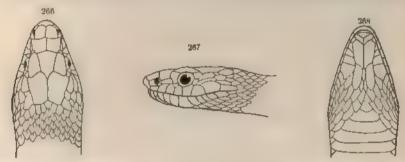
blackish cross bands

1891. Coluber phyllophus Bot lenger, Ann. Mag. Nat. Hist. (6), VII, May, 1891, p. 280 (type-locality Kiukiang, China; types in Brit. Mus., Pratt. collector. Cat. Sn. Brit. Mus., II, 1894. p. 55 (Kiukiang, Ningpo., Proc. in Zool. Soc., London. 1899, p. 165 (Kuatun, Prov. Fokien). -Guenther, Ann. Mus. Zool. St. Petershong, I, 1896, p. 205 (Prov. Szechnen. Wall, Proc. Zool. Soc. London, 1903, p. 92 (China). Werner, Alih. Bayer. Akad. Wies. (Muenich), II. Klasse, XII, Pt. 2, 1904, p. 356 (Ningpo. Mts., near. Shanghai).

Description. Adult male; Science College Museum, Tokyo, No. 5; Taipa, Formosa; December, 1897; T. Tada, collector (figs. 266-268). Rostral about one-third wider than high, largely visible from above; internasals longer than broad, nearly as long as prefrontals, the latter broadly in contact with supraocular; frontal considerably longer than wide, longer than its distance from rostral, but

a Signifying keeled; with reference to the strong development of the keels of the scales.

shorter than parietals, the sides strongly convergent backward, the width at the posterior lateral angle being less than width of supraocular; nostril large, between two nasals, the posterior of which is less
than half as wide as the anterior; loreal much wider than high; one
preocular, not in contact with frontal; a subpreocular; eye large, its
diameter equaling half its distance from tip of snout; two postoculars; temporals 2 + 3; eight supralabials, seventh largest, fourth and
fifth entering eye; five lower labials in contact with anterior chinshields, which are slightly longer than posterior; 23 rows of scales
all strongly keeled except outer two rows; 214 ventrals, angularly
bent laterally; anal divided; 97 pairs of subcaudals. Color (in alcohol) olive clay color, pale underneath, back with blackish ill-defined
cross markings the black color only involving the edge of the scales



Figs 266-268.—Elaphe Carinata. \$\forall \times \text{NAT SIZE}\$ 266, TOP OF HEAD, 267, SIDE OF HEAD, 268, UNDERSIDE OF HEAD NO. 5 Sci Coll. Toryo.

and the skin between; a longitudinal blackish band on ventrals near the lateral angle and frequently interrupted; each ventral with the posterior edge irregularly marked with black; subcaudals narrowly edged with black so as to form a black median line; all the upper and lateral cephalic sutures marked with black.

Dimerisions			
			978 23%
Total length .			1 - 455
Snout to vent .			1, 155
Vent to tip of tail			300
Tip of snort to posterior and of purietals			34

The young (U.S.N.M. No. 36508) are much paler and underneath uniform white; back with a few scattered black dots which, on the anterior half of the body, form short and narrow cross lines; on posterior half an obscure, pale brown longitudinal line on each side; upturned ends of ventrals with small black dots, forming an irregular longitudinal series; upper and lower labials with dark brown sutures.

Variation. -The commonest variation is apparently in the number of temporals, the extremes recorded (for Chinese specimens) being 1+2 and 3+3. The scale rows are almost always 23, but Wall mentions

a Chinese specimen with 21. Ventrals vary from 208 to 221 and caudals from 80 to 97. According to Boulenger an undivided anal and nine supralabials are rare features. Four lower labials in contact with anterior chin-shields as often as five. The above figures are derived from 17 specimens, of which only three are from Formosa.

This snake evidently grows to a great size, as Doctor Wall has recorded a specimen measuring 8 feet 1 inch (2.44 meters.).

Habitat.—Peculiar to China, where it has been obtained from near Shanghai, in the north, to Kuatun in Fokien in the south, and as far west as Lung-ngan-fu in the western part of the province of Szechuen.

In Formosa three specimens were collected by Mr. Tada in 1897, and a fourth specimen is in the zoological museum in Christiania, collected by Mr. Navara in 1894.

Museum.	No	Sex and age	Locality.	When collected	By whom collected	Scale rown.	Ventrala.	Anal.	Butcaudals.	Supmiablais,	Tamporate
U.S.N.M Sci. Coil. Tokyo Do.	30508 10	Young a do	Formosa do Tuipa, Formosa	1807 Sept. 29 Sept. —	T Tada. do .	23	217 212 214	2 2	93 90 97	8 8	2-3 2-3
	a P	309		b Description	on, p. 308, fig	266	-268.				

List of specimens of Elaphe carinata.

ELAPHE RUFODORSATA a (Cantor).

1842. Tropidonotus rufodorsatus Canton, Zool. Chusan (pl. XIII) (type-locality, Chusan, China; types in Brit. Mus., Cantor, collector) - Coluber rufodorsatus Swinhoe, Ann. Mag. Nat. Hist. (3), XII, 1863, p. 225 (Tamsui, Formosa). Guenther, Rept. Brit. India, 1864, p. 238, pl. xx, fig. G .-STRAUCH, Mém. Acad Sci. St. Pétersb. (7), XXI, no. 4, 1873, pp. 79, 270 (Khinggan; High Gobi; Dauria; Possiet Bay) - MUELLER, Verh. Naturf. Ges Basel, VII, Pt 3, p 681 (Tientsin). Boettger, Offenbach. Ver. Naturk, 26-28 Ber., 1888, pp. 70, 130 (Shanghai); Ber. Senckenberg. Naturf Ges., 1894, p. 140 (Luechan Mts., Hankow), p. 144 (Lake Sitai, near Shanghai), Kat. Schl. Mus. Sencketfberg., 1898, p. 50 (Chinhai, near Ningpo). Boulenger, Cat Sn Brit Mus., 11, 1894 p. 43 (eastern China, Formosa, Hainan). -Wall, Proc. Zool. Soc. London, 1903, p. 91 (China) .- WERNER, Abh. Bayer Akad. Wiss (Muenich), II Klasse, XXII, Pt. 2, 1904, p. 356 (Shanghai, Hankow). Nikolski, Zap. Imp. Akad Nauk, S. Peterburg (8), XVII, no. 1 (1905), p. 248 (Possiet Bay; Korea) - Ablabes rufodorsatus Boulenger, Ann. Mag. Nat. Hist. (6), V. Feb. 1890, p. 138 (eastern Stheria, Peking).

^a Signifying red-backed.

1854. Ablabes see-lineatus. Di MERIL and Bibnon, Erpét. Gén. VII. Pt. 1, p. 324. (type-locality, China, types in Paris. Mus.). Coronella serlineata. JAN, Icon. Ophid., hvr. 14, 1865. pt. vi, fig. 2 (China., type.).

1886 Stmotes herze Boetteere, Zool. Anzerg , IX, 1886 p. 519, etype-locality, hills near Shanghai, type in Mus. Senekenberg , Herz, collector.

Description. Adult female; U.S.N.M. No. 21192; Seoul, Korea; October 8, 1883; P. L. Jouy, collector (figs. 269-271). Rostral very much broader than high, just visible from above; internasals small, very narrow in front, suture between them considerably shorter than between prefrontals, which are large and in contact with supraocular; frontal slightly longer than its distance from tip of snout, as long as interparietal suture, slightly broader in front than behind, not in contact with preocular; parietals long; nostril small, semicircular, situated a little above the center of the larger semidivided nasal; loreal large, somewhat longer than high; one preocular, not in contact with frontal; no subpreocular; two postoculars, upper larger



Figs 293-27) Flaphe by fordersata $-2 \times$ nat size 263 top of head. 270, side of head -271, underside of head. No 21192 U S N M

than lower; temporals 2 + 3; seven supralabials, third and fourth in contact with eye (on left side eight, fourth and fifth in contact); five lower labials, in contact with anterior chin-shields; posterior chin-shields shorter than anterior; 21 rows of smooth scales; ventrals 177; anal divided; 51 pairs of subcaudals; no ventral lateral keel. Color (in alcohol), above olive gray, with four series of small dark brown spots, the inner two occillated, the outer solid, which on the posterior half of the body join to form four continuous dark bands, extending to the tip of the tail; top of the head with a very distinct V-shaped mark, angle forward on the frontal and limbs extending far back on the neck, the edges of the mark strongly outlined by blackish brown; a similarly colored fleur-de-lis-shaped figure on the fronto-parietal suture; a blackish brown angular line on the prefrontals, continuing backward obliquely through the eye to angle of mouth and sides of

neck; underside whitish, ventrals outlined with black, and checkered with large square blotches; a black median line on the suture between the subcaudals.

Dimensions.	
	無無.
Total length	561
Snout to vent	470
Vent to tip of tail	91

Variation.—The normal number of supralabials is seven, but occasionally eight are found; thus in both of our Korean specimens there are eight on one side, and Doctor Werner found a similar number among five Chinese examples. Twenty-one scale rows seem to be the constant number. Boulenger mentions that two preoculars occur rarely. In the Korean specimen in the museum of the Michigan University the temporals show the unusual number 1+2. Doctor Wall mentions that in 15 Chinese specimens examined by him only one had four lower labials in contact with anterior chin-shields. Ventrals range between 162 and 190, subcaudals between 47 and 68.

Habitat.—China, from Peking to Hainan, according to specimens in British Museum.^a It occurs also in eastern Siberia from Lake Baikal to Amurland and Ussuri, where it has been taken at Vladivostok and Possiet Bay, near the Korean boundary, while the United States National Museum has two specimens collected by the late Mr. P. L. Jouy at Seoul, Korea, October 8, 1883. Another specimen from Korea, collected by Mr. G. A. Olinger, is in the museum of the Michigan University, and a third in the St. Petersburg Museum.

Swinhoe obtained it at Tamsui, in Formosa, and sent the specimens to British Museum.

List of specimens of Elaphe rufodorsata.

Museum No	Sex and Locality.	When col- locted.	By whom col- lected.	Scale rows	Ventrals	Amil	Subeaudals.	Supralabuls.
		1893.	1					
U.S. N.M 21191	Male Scoul, Korea .	Oct. 8	P. L. Jouy .	21	[66]	2	56	7-8 2+2-8
Do 21192	Female do	do	do	21	17	2		7-8 2+3
Mich. Univ . 30526	Adult. , Korea	.,	G. A. Olinger	23	167	2	πÖ	7 1+2
Brit. Mus., m	Fernale h Formosa		R. Swinhoe,	21	183	2	54	
Do π	ob ooh		do	21	78	-2	40	

^a As for the locality Hainan, see under Elaphe dione, p. 318, footnote

ELAPHE SCHRENCKII G Strauch.

1873 Elaphoschrenku Strauch, Mém Acad Sci St Pétersbourg (7), XXI, no 4, pp 100, 272 (type locality, Klunggan Mil Post, eastern Stheria (type, No 3706 St Petersh Acad Mus., Schrenck, collector) Coluber schenku Botlesofer, Ann Mag Nat Hist 6, V. Feb 1890 p 139 (Ussuri River Brit, Mus.) Cat Snakes Brit Mus. 11, 1894, p 48 (Ussuri R. Scoul, Korea) Walt, Proc. Zool. Soc. London 1903 pp 92, 100 (Amurland; Korea; N. Japan) Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, no. 1, 1905, p. 260 (Amurland; Korea, etc.).

1888 Elaphis cugatus Boettger, Offenbach Ver Naturk, 26-28 Ber. p. 72 (Korea, Mus Senckenb : Moellendorft, collector) (not of Schlegel)

1898 Coluber schrencki Boerroen Kat Schl Mus Senckenberg., p. 51 (Korea).

Description .- Male adult; U.S.N.M. No. 21187; Seoul, Korea; August, 1887, P. L. Jouy, collector. Rostral much broader than high, visible from above; internasals longer than broad, much smaller than prefrontals, which are in contact with supraocular; frontal shorter than its distance from tip of snout, equaling interparietal suture, much wider anteriorly than behind, the sides strongly convergent backward; supraoculars narrower than frontal; parietals rather short, equaling frontal and half of interprefrontal suture; nostril large, round, between two subequal nasals; loreal longer than high; one preocular, not in contact with frontal; one small subpreocular (absent on left side); two postoculars (lower fused with fifth supralabial on right side); temporals 2+3; eight supralabials, seventh largest, fourth and fifth entering eye: four lower labials in contact with anterior chin-shields; posterior chin-shields shorter than anterior; 23 rows of scales, the median ones distinctly keeled, the keels becoming more and more indistinct on the sides, disappearing entirely on the outer four or five rows: 214 ventrals, with indistinct lateral angle; anal divided; subcaudals, 70 pairs. Color (in alcohol) above dark isabella color, with scattered black specks occupying part of a scale; on the neck these spots become more numerous, and toward the tail the edges of the scales become dusky, with indications of longitudinal lines; head above like the back, with irregular dusky spots; supralabials whitish, except the last, all with black posterior edge; a black line obliquely from eye to edge of lip anterior to corner of mouth; indications of a pale black-edged line between nostril and eye: lower labials with dusky posterior edges: underside whitish. the anterior ventrals dark-edged.

^a For Dr. Leopold von Schrenek the celebrated Russian naturalist and explorer of Amurland. He was born in the Kharkov government on April 24 1826, and died in St. Petersburg on January 20, 1894, when director of the Anthropological-Ethnographical Museum of the Academy of Sciences. He traveled in eastern Siberia and in Sakhalin during 1854-1856.

Dimensions

	364 155
Total length	1 580
Snout to yent	1 330
Vent to tip of tail	250

The young have a very characteristic head pattern. Thus, in the specimen in the Philadelphia Academy of Sciences (No. 15255), from Seoul, Korea, the ground color is brownish with white black-edged bands and spots, as follows: A broad band from upper postocular over temporals past the last supralabial, confluent with the white underside; a black line from lower postocular over suture between seventh and eighth supralabials to edge of lip; a white spot on frontal anteriorly, and a small one on each of the parietals near the frontal; an interrupted white cross band on supraoculars; a festooned white band across anterior half of prefrontals, a white spot on rostral; a white horizontal band from nostril to preocular; semicircular black markings on anterior supralabials; an inverted Y-shaped white mark on upper neck; back with rhomboidal brown black-edged spots separated by whitish cross bands.

Halfgrown specimens, such as U.S.N.M. No 21189, show traces of this pattern, especially on the posterior part of the body and on sides of head, this specimen also has indication of a checker pattern on the underside.

Very old specimens are often nearly uniform pale isabella-color.

Variation. Apparently the most variable feature of the scutellation of this species is the frequent absence of the subprecoular. Thus, out of 11 specimens Strauch found it lacking on both sides in five, while of my five Korean examples it is absent in three on one side. Only in one of our specimens is there a ninth supralabial on one side, while in the Michigan University specimen from Korea the number of supralabials is reduced to six on one side and seven on the other. The number of scale rows appears to be very constant, all the 19 specimens on record or examined by me having 23. The number of ventrals is also confined within narrow limits, namely, 208 to 226. The subcaudals do not exceed 76 and rarely go as low as 61. One specimen (U.S.N.M. No. 21186) has an undivided anal, and I also believe that it is undivided in the young specimen in the Philadelphia Academy of Sciences.

Habitat. Eastern Asia from the River Argun, the tributary of the Aniur, ranging east to the sea. The cotypes were collected in the Khinggan Mountains by Doctor Radde, according to Schrenck, but as I can not find that Radde ever visited the main body of this chain, which is situated in Chinese Manchuria, it is most likely that he obtained his specimens along the borders of the rivers Argun and Amur, which skirt the mountains mentioned Dybowski collected it at Vladivostok and Posiet Bay, near the Korean frontier, and in Korea

itself it has been collected more recently by Moellendorff, Campbell, Ferebee and Jouy. It seems to be rather common in Korea, especially around Seoul whence Jouy brought us four specimens.

Strauch enumerates two specimens in the St. Petersburg Museum as having been collected by Mr. Goschkewitsch in Japan, and as this gentleman was for some little time Russian consul in Hakodate, Strauch assumes that they were collected in Yezo. The occurrence of this species in Japan is entirely unconfirmed and the probability is that the specimens really came from the mainland opposite, though possibly shipped from Japan. In this connection it is well to remember that Elaphe dione is also credited to Yezo by the same authority on material from the same source. Neither the one nor the other species has been found on Japanese territory by other collectors.^a

List of specimens of Elaphe schrenckii

Museum.	No.	Sex and age.	Locality.	When col-	By whom col- lected	Scale rowe.	Ventrale	Anni	Sulvandals	Supraint isls
				1863.						
USNM	14000	Maled	Korea .		Dr N M Ferebee	23	212	2	62.2+	3 н
Do	21186	Female	Scoul, Korea	Oct 16	P L Jouy	23	226	ı'	2+.	3 8 9
Do	21187	Mule	do.	Aug	.do .	23	214	2	70.2+	3 8
Do	21188	Female.	. dn	dn	do	23	218	2	72.2+	3 8
Do.	21199	Male .	do .	do	do	23	225	2	70.24	3 8
				1800						
Phila Acad.	15255	Young	"du	Sept	Dr W fl Jones	23			702+	3 , 8
Mich Univ	30529	Adult	Korea .		G A Ollnger	23	219	2	72.2+	2 67
Senckenherg		(7	do		Moethendorff	23	220	2	70	
Brit. Mus	b	Youngd	Seoul, Korea		C W Campbell	23	210	2	58	
Do	r	Marier	ep		do .	23	211	2	76	
Du	q.	Femaled	Ussuri River			23	220	2	68	
St Petersburg	2097	(7)	Possiet Bay			23	206	2	70	
Do	295ñ		[lapan*]		Gosehkewitsch	23	219	2		
Da,	2956	(/)	do .		do	23	211	2	71 .	
	'				-					
		th, 1,635 m n. p. 313		etiger ulenger, Ca		Bou Stra				

ELAPHE DIONE & (Pallas).

1773. Coluber dione Pattas, Reise Russ, Reichs, H, p. 717. type-locality, 'Salt steppes toward the Caspian Sea", —Boutesger, Ann. Mag. Nat. Hist. (6), V. Feb., 1890, p. 138 (Ussuri River, Peking), Cat. Sn. Brit. Mus. H, 1894, p. 44 (southern Russia to Japan). —Boettger, Ber. Sein kenberg. Naturf. Ges., 1894, p. 149. ('hefu. China). Kat. Schl. Mus. Sinckenberg., 1898, p. 5). ('hefu. Turkestan'. Stone, Proc. Phila Acad., 1899, p. 184.)

^a Sec also under Agkintrodon blomhofte, p. 452

b From Διώνη, a name in Greek mythology, the mother of Aphrodito.

(northern Pechili, China).—Méhely, Zichy's Dritte Asiat. Forschungsr., II, 1901, p. 58 (Peking).—Wall, Proc. Zool. Soc. London, 1903, p. 91 (China).—Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, No. 1, 1905, p. 249 (Vladivostok, Korea, etc.).—Elaphis dione Duméril and Bibron, Erpét. Gén., VII, Pt. 1, p. 248.—Guenther, Rept. Brit. India, 1864, p. 240 (Kaukasus; Peking).—Jan, Icon. Ophid., livr. 21, 1867, pl. III, fig. A (Sarepta, Russia).—Strauch, Mém. Acad. Sci. St. Pétersb. (7), XXI, No. 4, 1873, pp. 82, 270 (eastern Russia, Siberia, Amur, Ussuri, Korea, Japan); in Przevalski's Mongoliya i Strana Tangutov, III, 1876, p. 46 (Ordos).—Moellendorff, Journ. N. China Br. R. Asiat. Soc. (n. s.), XI, 1877, p. 104 (Peking; Manchuria).—Boettger, Offenbach. Ver. Naturk. 26–28 Ber., 1888, p. 131 (East Europe to North China and Korea).—Werner, Abh. Bayer. Akad. Wiss. (Muenchen), II Klasse, XXII, Pt. 2, 1904, p. 356 (Tsingtau, China; Peking).

- 1802. Coluber diana LATREILLE, Hist. Nat. Rept., IV, p. 159 (emendation).
- 1831. Coluber eremita Eichwald, Zool. Special., III (p. 174).
- 1837. Coluber maeoticus Rathke, Mém. Sav. Étrang. Acad. St. Pétersb., III, p. 433, pl. 1, figs. 9-11 (type-locality, Caspian Sea at the mouth of Riv. Ural; Goebel, collector).

Description.—Adult male; U.S.N.M. No. 14610; Korea; Dr. N. M. Ferebee, collector. Rostral much broader than high, visible from above; internasals much broader than long, only half as long as prefrontals which are broadly in contact with supraocular; frontal nearly as long as its distance from tip of snout, somewhat wider in front than behind; parietals longer than frontal, interparietal suture longer than distance of frontal from rostral; nostril large, between two nasals, the anterior slightly larger than the posterior; loreal longer than high; one preocular, not in contact with frontal; one subpreocular; two postoculars; temporals 2+3; eight supralabials, seventh largest, fourth and fifth entering eye; five lower labials in contact with anterior chin-shields, which are as long as the posterior; 25 rows of nearly smooth scales; 204 ventrals; anal divided; 65 pairs of subcaudals. Color (in alcohol) light tawny-olive above, with numerous irregular narrow dusky crossbars, about one to one and a half scale wide; head with slightly darker, black-edged markings consisting of an irregular chevron mark on parietals and upper neck, a cross mark on prefrontals and frontal extending backward obliquely through eye and reaching commissure at the angle of mouth; supralabials, including lower edge of seventh and eighth, pale yellow; underside pale yellowish with irregular dusky spots which near the obtuse lateral angle of the ventrals assume the character of an interrupted longitudinal line.

Dimensions.

	mm.
Total length	825
Snout to vent	
Vent to tip of tail	148

In the young (No. 21193) (fig. 272) the markings are darker and more distinct; the pattern on the head shows a fleur-de-lis figure on the interparietal suture; the lateral dark spots on the underside are blacker. broader, with a convex anterior outline; there are three pale dorsal lines, the median one not well defined and interrupted by the dark crossbars, the lateral ones on the fifth, sixth, and seventh scale rows continuous and cutting off a series of blackish lateral spots from the dorsal dark crossbars.

This pattern is often retained in tolerably large specimens.

Variation. The variation in our Korean material is quite insignificant; thus all possess a subpreocular, but, as might be expected in a species of so wide distribution, many anomalies are found

when a large series is studied. Strauch examined 84 specimens from nearly the entire range, and has enumerated the deviations he found. Thus five specimens lacked the subpreccular on both sides and five on one side; thirteen had three postoculars on both sides and six had three on one side; four specimens had nine supralabials on both sides and two specimens only seven on both sides, while eleven had nine or seven on one side only. The number of scale rows varies in about even proportions between 23 and 25 in 43 specimens.4 As to the subcaudals, Strauch mentions as a curious anomaly only found in some east Siberian and west Chinese specimens that some of the subcaudals are entire.



FIG. 272,- ELAPHE DIONE. 2 X NAT. SIZE. TOP OF HEAD. No. 21193, U.S.N M.

The number of ventrals varies between 172 and 214. In this a slight tendency to geographical variation can be traced. Thus in 42 specimens from Siberia the ventrals vary between 180 and 214 in those west of the Yenisei River. but between 172 and 195 in those from east of that river. In 17 Chinese specimens they vary again between 180 and 213 ventrals, while in five Korean specimens the number is 203–207

One of our specimens (No. 21190) shows the anomaly of having on both sides a small shield cut off from the third supralabial between it and the loreal Another (No. 14331) has two presuboculars on each side.

Habitat. - A species of extraordinarily wide distribution, ranging. as it does, from the valley of the Volga in southeastern Russia through

o Curronsly enough, in 21 specimens in British Museum enumerated by Boulenger, of which 12 were from China, from which country Strauch had no specimens, 13 have 25 scale rows, 6 bave 27 and only 2 have 23. All our Korean specimens have 25, and I am inclined to regard this as the normal number. This agrees with Doctor Wall, who found 23 m 3 25 m 10, and 27 m 1 Chinese specimens, and with Doctor Werner, who in 4 specimens from China found 3 with 25 and 1 with 27 scale rows, the latter in a specımen from Tsıngtau.

temperate Asia to the Amur country in the north and south through eastern China to Kiukiang, and possibly even to the island of Hainan.^a

Dybowski, according to Strauch, collected it on the banks of the Amur between Seljonoi-Less and Khabarovka, and also at Posiet Bay. It is also recorded from the Ussuri, the Sungari, and upper Amur, and the Hamburg Museum has a specimen each from Vladivostok and Pokrovka, collected by Dieckmann (Nos. 2168, 2169). The St. Petersburg Museum also has a specimen from Vladivostok, collected by Doctor Zander.

Schrenck and Doctor Ferebee obtained specimens in Korea and

Jouy brought home three specimens from Seoul.

Two specimens obtained in 1861 by the St. Petersburg Academy from the Russian consul in Hakodate, Mr. Goschkewitsch, are credited by Strauch to Japan, but, as explained under the head of *Elaphe schrenckii*, I do not place any faith in their having been collected in any of the Japanese islands

List of specimens of Elaphe dione

Maseum	No	Sex and age	Locality	When rodected	By whom col- lected or from whom received	Scale rows	Ventrals	Anut	Subenudals	Temporals	Supratablete.
tsnm	1432.	Young	Ala Tan, Sthe-		Mua.St Peterab	25	207	2	6)	3+4	8
Do	14331	Female	Amor tand		.do	25	192	2.	50	2+4	8
Īω.	14010	Mase 4.	Kores		Dr N M Fere	25	304	2	0/4	2+3	24
					ties				ľ		
				1883							
Do .	21190	Female a	Seoul, Korea	tiet 8	P. L. Jouv.	25	205	2		2+3	8
Lio	21193	5 oung c	ďo –	Tune,	do	25	207	2	73	3+3	8
Do	21194	Female	do	Aug	do	25	204	2	68	2 + 2 - 3 A	9
Brit Mus	h	Male 4	Ussurl River		Warsaw Mus	23	179	21	40.		
St Petersb	2910	(r)	Bikinda Ls-			25	183	2"			
			aurl								
Da	2011	1.5	Dshare Amur			25	195	2	6.1		
Do	2953	(E	[Japan ²]		Coschkewitseli	23	194	4	5%		
T)c	2954	(r	do		do	230	180	2	62		
Do	3704	(c	Korea			23	203	2	59		
-											

oP 347 Obescription, p 316 Fig 272 of Boulenger, Cat II p 45. «Strauch p 271.

This beality is given on the authority of a specimen in British Museum said to have been collected at Hojhow by J. Neumann. It should be noted in this connection, however, that several rather more northern forms have been attributed to the same locality upon material received from the same source, such as Vatric tigrina, Dinodon rule material received from the same source, such as Vatric tigrina, Dinodon rule material received from the same source, such as Vatric tigrina, Dinodon rule material received from the same source, such as Vatric tigrina, Dinodon rule materials, Zamenis spinalis, Elaphe ruledorsata, Aghistrodon blomhoffii. None of these species have been found in that island by other collectors, see Boettoer, Liste der von der Insel Haman bekannten Krachthiere, in Ber Senckenberg Naturf Ges., 1891 pp. 129–136. Cope On a Collection of Bairachia and Reptilia from the Island of Haman in Proc. Phila Acad., 1891, pp. 423–428. Bouteson, On the Reptiles, Batrachians and Fishes collected by the late Mr. John Whitehead in the Interior of Haman in Proc. Zoci. Soc. London, 1899, pp. 956–962, pls. 1xvi. Lxix., and the sagestion that these northern species might have come from the mountainous interior is not supported by the result of Whitehead's expedition. It seems most conservative, therefore, to wait for corroboration before the island of Haman be given as an undenbted locality for those species.

ELAPHE TÆNIURUS# Cope.

1858 Elaphis rirgatus Guenther, Cut Colubr. Sn. Brit. Mas., p. 95 (part. specimen.c, Chikiang, China) (not of Schlegel.

1860 Elaphe taniamis Cope Proc Phila Acad , 1860, p 565 (type-locality, Ningpo, China, type in Phila Acad Mus, McCartee, collector) Elaphis taniurus Ge вхтива, Rept. Brit. India, 1864, р. 242 (Chikiang, Ningbo) STRAUCH, Mém Acad Sci St Pétersh (7), XXI, no. 4, 1873, pp. 103, 272 (Possiet Bay Moeltendorff, Journ. N. China Br. R Asiat Soc. (n. s.) XI, 1877, p. 104 (Tachiosse, NW. of Peking) -Bot lenger, Ann. Mag Nat Hist 5 , XIX, 1887, p 170 (part Chikiang, Shanghai; Peking). BOETTGER, Offenbach. Ver. Naturk. 26-28 Ber., 1888, pp. 71, 131 (Shanghar Formosa) (oluber tengurus Bottenger, Fauna Brit. India, Rept., 1890, p. 333 (part. Manchuria, China, Darjeeling Ann. Mag Nat Hist (6, V, Feb 1900 p 139 chills northwest of Peking), Cat Snakes Brit Mus., II, 1894, p. 47 (part western hills of Peking; Shanghar, Chikiang, mountains of Kinkiang Darjeeling Borttger, Ber Senckenberg Naturf Ges., 1894, p. 138 (South Cape, Formosa); p. 144 (Wusung near Shanghar); Kat. Schl. Mus. Senckenberg , 1898, p 51 (Shanghai, Formosa) Wall, Proc. Zool, Soc. London, 1903 p 92 (Yangtze Valley, Shanghar). Nikolski, Zap Imp Akad Nauk, S. Peterburg (8, XVII, no. 1, 1905, p. 259 (Possiet Bay, Novgorodsk)

1879 Elaphis guananensis Anderson, Zool Res Yunnan Exped., p. 813 (type-locality Momien Yunnan)

Several forms of varying degree of distinctness seem to cluster around E. teniurus The typical form which extends from the Himalayas over China and Korea to the Asnur Province is characterized by having 23-25 scale rows, 226-258 ventrals, and 90-111 subcaudals, a formula derived from about 20 specimens. A slightly differentiated form with 25-27 scale rows, 251-260 ventrals, and 104-124 subcaudals inhabits the southern group of the Riu Kiu Islands, as demonstrated by 5 specimens examined by me. This is Boettger's Coluber schmackeri—Finally, the form which Fischer called E. grabowskyi seems clearly entitled to recognition, there being a considerable gap between typical E. teniurus and the specimens

σ From rairia, land; ουρά, tail

b Coluber transcens rulleyi BUTLER, Journ Bombay Nat. Hist Soc., XII, 1899 (p. 426), is unknown to me as that publication is not now received in Washington

c 1885 Elaphos graboroskyr Fischer, Archiv Naturg LI, Pt. 1 1885, p. 59. author's separate p. 19., pl. rv. figs. 3a e (type-locality Batu Hapu Pengaron, southeast Berneo - type in British Museum, Grabowski, collector).

¹⁸⁸⁷ Elaphos tancarus Bos descen Ann Mag Nat Hist 5 . XIX р 170 (part Pajo, Sumatra) - Coluber tancarus Bottesche, Cat Sn. Brit. Mus., 11 (1894, р 47 (part SE Borneo, Sumatra) - Flower Proc. Zool See London, 1899, р 668 (Kuala Lumpar Malay peninsula

I have added the last reference on the strength of a specimen in the United States National Museum. No. 26234 collected by Dr. W. L. Abbott in Trong, Lower Sian, It is undoubtedly an E. igabousky, with 25 scale rows, 295 ventrals, and 111 subcaudals, 9 supralabilits, and preoculars broadly in contact with frontal. Mr. Flower gives no scale formulas of his specimens, but it seems highly probable that they are the same as Abbott's.

Doctor Boettger reports two specimens in Museum Senckenbergianum from Formosa, though without recording their scale formula. However, as he is the author of *E. schmackeri* and also had specimens from Shanghai for comparison the determination can not well be doubted.

List of specimens of Elaphe tensurus.

Museum	No '	Sex and age.	Locality	When collect ad	By whem col- sected	Scale rows	ventrals	1 1131	Savesadabs. Temporals Sapralabals.
UBNM	7499	Young	China.		W Stimpson	25	230	2	95 1+2 9 9
Do	14608	Malen	Korea		Dr N M Ferebee	25	220.	2	111 2+3-4 8
Do	31718	't oung	Shanghai China		E Deachamps	25	233	2	103, 2+1 8-9
St l'etersb	3192	(6)	Possict Bay		Butakow	23	231	2	98 .
	a Desc	ription p	320. figs 273 274		6 S	trap	sh. B	272	

ELAPHE SCHMACKERI " (Boettger).

1895. Coluber schmacker Boettreer Zool Anz , XVIII, 8 July, 1895 p. 268 (type-locality Mijakoshima Sake shima group, Riu Kiu , type in Mus Senekenberg , Schmacker, collector); Kat Schl. Mus Senekenberg , 1898, p. 53 — Bouldenger, Cat Su Brit Mus , III, 1896, p. 627 Wall. Proc Zool, Soc. London, 1903, p. 101 (Loo Choos); 1905, II, p. 515 (Ishigaki).

Notwithstanding the fact that its original describer, Doctor Boettger, compares this form with E. moellendorfhi, I can only regard it
as an offshoot of E. tæniurus. In fact I have hesitated long whether
it would not be most consistent to call it Elaphe tæniurus schmackeri,
as the scale formulas plainly intergrade. However, as long as my
colleagues are satisfied with the binominal appellation I can have no
objection.

This species, which in Iriomote shima is known as "Ki-tokara" according to Doctor Lenz, is so closely related to Elaphe teniurus that a separate description seems unnecessary. The coloration is identical. The main differences in scutellation are the greater number of scale rows, ventrals, and subcaudals, and the somewhat feebler carination of the dorsal scales. Thanks to the kindness of Doctor Boettger I have been able to examine his type specimen in Museum Senckenbergianum and satisfied myself that it has keels, though very faint ones, on the median scales. In the Hamburg Museum specimen I found very weak keels on the median scales while about eight lateral rows on each side are practically smooth, and in the specimen before

a For the late Mr. B. Schmacker, of Shanghai

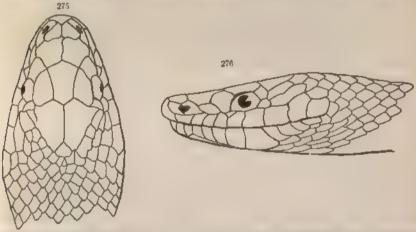
me now (No. 5, Sci. Coll. Tokyo, figs. 275-276) the outer nine scale rows are smooth, but the seven middle ones have distinct though feeble keels. This specimen measures as follows:

		Dimensions	
			27% 22%
Total length			1,870
Shout to vent .			1, 445
Vent to tip of t	ul.		425

The type as recorded by Doctor Boettger measures 2,080 mm. in total length, of which 445 belong to the tail. This species consequently grows to a considerable size

Variation.—Very much as in Elaphe teniurus, though the range between the extremes of the number of ventrals and subcaudals is much less, as might be expected from the much more restricted habitat

In most specimens the preocular is not in contact with the frontal, but in the Hamburg Museum specimen these two shields touch on



Figs 275-276.- Elaphe schmackeri Nat size. 275 top of head, 276, sork of head. No. 5, Sci. Coll. Tokyo.

the right side, and in the specimen before me (No. 5) they practically touch on both sides. In the type, on the contrary, they are widely separated.

A single anal is found in No. 89, Science College Museum, and in this the lower temporals of both rows are consolidated so as to make only 2+2 temporals, but normally they are 2+3

In the Hamburg Museum specimen there are 10 supralabials and the Ishigaki shima specimen recorded by Dr. Wall has ten on one side.

Habitat. So far as known, this form of E. tæniurus is confined to the southern group of the Riu Kius. The type in Museum Senckenbergianum is supposed to be from Miyakoshima, from which island

there is also a large specimen with mutilated tail in the Imperial Museum, Ueno Park, Tokyo (No. 6), and another in Science College Museum, Tokyo (No. 5). Another large specimen (No. 89) is in the same museum, collected by Mr. Tashiro in Iriomote shima, and a specimen from the same island in the Hamburg Museum (No. 2590) collected by Doctor Lenz on March 13, 1897, was obtained in the mountains of the interior, according to a note attached to it.. Dr. Wall has recently recorded a specimen from Ishigaki shima.

Museum.	No.	Sex and age.	Locality.	When collected.	By whom collected or from whom received.	ဥ	Ventrals.	Anal.	Subcaudals.	Temporala.	Supralahials.
Sci. Coll., To-	5	Male a	Miyako shima			25	251	2	117		9
Imp. Nat. Tokyo.	6	Adult	do			27	254	2	• • •	2+2-3	9
				1888.			!		-	!	}
Sci. Coll., To-	89	do	Iriomote shi-	June 14 1897.	Tashiro	25	259	1	118	2+3	9

List of specimens of Elaphe schmackeri.

a P. 323, figs. 275-276.

Senckenberg 8056.2ª Maleb...

b Type.

B. Schmacker.

27 254

Mar. 13 Doctor Lenz

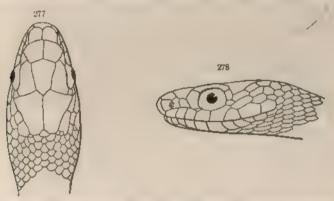
ELAPHE CLIMACOPHORA a (Boie).

AODAISHŌ.

- 1826. Coluber climacophorus Boie, Isis, 1826, p. 210, (type-locality, Japan; Blomhoff, collector).—Boulenger, Cat. Sn. Brit. Mus., II, 1894, p. 54 (Nagasaki; Nikko; Miyanoshta; Mt. Onsen, Shimabara).—Boettger, Kat. Schl. Mus. Senckenberg., 1898, p. 52 (Hakone Mts.; Miyanoshta; Nikko).—Wall, Proc. Zool. Soc. London, 1903, p. 100 (Nikko); 1905, II, p. 514 (Hondo).—Werner, Abh. Bayer. Akad. Wiss. (Muenchen), II Klasse, XXII, Pt. 2, 1904, p. 356 (Tsingtau and Hankow, China).
- 1837. Coluber virgatus Schlegel, Phys. Serp., I, p. 146; II, p. 145 (type-locality, Japan; types in Leiden Mus.; Buerger and Siebold, collectors) (not of Bonnaterre, 1790).—Schlegeland Temminck, Fauna Japon., Rept., 1837, pp. 83, 139 (Japan).—Elaphis virgatus Duméril and Bibron, Erpét. Gén., VII, Pt. 1, 1854, p. 261 (Japan).—Bleeker, Natuurk. Tijdschr. Nederland. Indië, XVI, 1858, p. 204 (Japan).—Jan, Icon. Ophid., livr. 21, 1867, pl. 1 (Japan).—Hilgendorf, Sitz. Ber. Ges. Naturf. Fr. Berlin, 1880, p. 113 (Tokyo).—Okada, Cat. Vert. Japan, 1891, p. 68 (Tokyo; Osaka; Awaji; Nagato; Yezo).—Wall, Journ. Bombay Soc. Nat. Hist., XIV, 1902, p. 375 (Arima).—Elaphis virgata Martens, Preuss. Exped. Ost-Asiens, Zool., I, 1866, p. 111; 1876, p. 379 (Yokohama).—Hilgendorf, Mitth. Deutsch. Ges. Ost-Asiens, I, heft 10, 1876, p. 29 (Tokyo).—Fritze, Mitth. Deutsch. Ges. Ost-Asiens, V, heft 46, 1891, p. 238 (Yezo).
- 1837. Coluber quadrivirgatus Temminck and Schlegel, Fauna Japon., Rept., Ophid. pl. 11 (error; not of the text).

^aFrom κλὶμαξ, ladder, φορος, carrying; referring to the pattern on the back.

Description (figs. 277-278). Adult male; U.S.N.M. No. 31874; Kochi, Shikoku; May, 1902; Dr. H. M. Smith, collector. Rostral visible from above, much broader than high, internasals about as broad as long, smaller than prefrontals which are in contact with supraocular; frontal as long as its distance from rostral and as the interparietal suture, much broader in front than behind; parietals longer than distance of rostral from tip of snout, much narrowed and pointed behind; nostril large, rounded, between two subequal nasals; loreal longer than high; one preocular, not in contact with frontal; one subpreocular; two postoculars; temporals 2 + 3, supralabials eight, seventh largest, fourth and fifth entering eye; four lower labials in contact with anterior chin-shields, which are of about the same length as the posterior; 23 rows of scales, most of which are distinctly



Figs. 277-278 - Elaphe climacophora $2 \times$ kat size 277, for of head; 278, side of head. No. 30551 U S N M

keeled, but outer two rows, at least, perfectly smooth; 228 ventrals; anal divided; 111 pairs of subcaudals; the ventrals angularly bent laterally. Color (in alcohol) dark umber brown above with four somewhat obscure darker longitudinal bands, the lower ones occupying four scale rows, viz, second to fifth, the upper ones three rows, viz, eighth, ninth, and tenth; head uniform, with a blackish oblique band from eye backward to the edge of the lip crossing and occupying the whole of the last supralabial; other supralabials pale, lower labials and throat whitish; rest of underside bluish slate gray, the ventrals pale-edged behind and with the lateral angle marked by a narrow longitudinal line.

		D	imens	rions.		
						mm.
Total length					 	1, 365
Snout to vent						1 040
Vent to tip of tail						. 325

The young, for instance No. 34050, have no longitudinal dark bands; on the back there are numerous brown transverse, black-edged spots, separated by whitish cross bands and alternating on the sides with a series of brown spots; whole underside whitish, posteriorly with dark edges to the ventrals; an oblique blackish band from eye backward crossing the last supralabial, but otherwise no pattern on head; supralabials narrowly edged with dusky.

Variation.—Only one specimen with an undivided anal is recorded. The subpreocular is more variable; it is absent on one side in our No. 34003; in the Hamburg Museum No. 2427 it is lacking on both sides, though indicated on the right side by a minute granule; Doctor Wall has found it absent in one specimen in a lot of eleven; Hilgendorf in 16 specimens found it absent in one on both sides and on one side in one. He also found three postoculars on both sides in two specimens and on one side in one specimen, while one postocular only was present once on both sides and twice on one side. Doctor Wall records two specimen, with three anterior temporals on both sides. In all specimens examined by me the prefrontals are in contact with supraocular. The two specimens from Shikoku have the parietals unusually pointed behind. In the young the frontal is longer relative to its distance from tip of snout.

The normal number of scale rows appears to be 23, but 25 per cent of the specimens recorded below have 25. Ventrals range between 224 and 244, subcaudals between 97 and 122.

Habitat. Formerly believed to be confined to Japan proper where it appears to be common from Kiusiu to Yezo, there being numerous specimens from various localities in the museums. Doctor Werner has recently recorded two specimens in the Munich Zoological Museum said to have been collected by Doctor Haberer in Tsingtau and Hankow, China—It should be remembered, however, that he also collected in Japan and that he has credited two more Japanese species to China, which have not been obtained there by any other collector (see pp. 331, 336)

There are two specimens (No. 7) in the Imperial Museum, Ueno Park, Tokyo, which are said to be from Okinawa shima, but the locality given is almost certainly erroneous.

^a Tokyo; Mount Fuji, Yokohama, Kochi, Shikoku (U.S. Nat. Mus.). Mount Onsen, Shimabara, Kiusur, Nagasaki Nikko Miyanoshta Brit Mus.). Tokyo, Nikko (Sci. Coll Tokyo. Hakom Mis. Miyanoshta, Nikko Mus. Senekenberg.). Nagasaki; Yamato, Kawachi (Hamburg Mus.). Nagasaki (Stockholm Mus.).

List of apecimens of Elaphe chinicophora

Museum	No.	Sex and	Locality	When collected	By whom	Scale rows	Ventrals	Anal	Sulwandata	Temporals	SupralaMala
USNM	4678	(la)(gr	Japan	1903.	Doctor Mor-	25	228;	2	102	2+3	8
Do	31872	Male .	Kochi, Shi- kokii	May -	Dr H M Smith	25	234	2	107	2+3	8
Dσ	31874	da.o	ųo.	do 1902.	ob,	23	228	1	111	2+3	8
Dn	34002	Femuse	Yokohatita	May 2	A Owston	23	238	2	103	2+2	8-9
Do	34003	Mule	rto	do 1888	dа .	23	22%	2	90	2+3	8
Dn	34027	gano f	Mount Eq.	Aug.	do	23	224	2,	101	2+3	8
Do	34050	de	do	do	do	23	226	3,	110	3-2+3,	8
Do	35551	do.8	Tekyo*	1896	Ser Co.) To- kyo.	25	231	21	102	2+2	8
Hamburg	2427	Male	Kawachi	Jan	f Lenz	23	230	21	99		8
Leiden	386		Lapan		you sighold		230		114		
D0	360		do	1801	do		233		98		
Imp Mus Tokyo	î		(Okanawa ? °)			23	231	2;		2+3	8
Brit Mus	a	Femaled	Јарап		Leiden Mus.	23	231	2	100		
Do	ь	Hattgrd	do		do	23	,134	2	112		
Do	- (Young a	do		Sir R Owen	23	222	2	108		
Tie	d	1/p-d	do		Mr Adams	123		j			
Do		Feb aled			Mr. Whitely	23		2	103		
120	f	3 congra	do		do	235			116		
Do	9	- de e	NIEko		do	23		2	100		
Do .	h	dor	Mivamishta		1 H Leech		ESC:	2	100		
Da	1	dar	do		Qci	23		2	97		7.0
Þπ	k	Male	Maint Onser 8' milbirta		P Holst	25	2.34	2	94		i

a Description, p. 32%

ELAPHE QUADRIVIRGATA " (Boie).

BRIMAREBI.

Plate XXI

1826 Coluber quadrivirgatus Boie, Isis, 1826 p. 209, (type-locality, Japan, Blomhoff, collector., Bijdr Natuurk Wetensch , H, Pt 1, 1827 p 256 Schlegel. Phys. Serp., 1837, I, p. 146, II, p. 147, pl. v. figs. 15, 26 (Japan) TEMMINGK and SCHUFGEL Fauna Jap . Rept . 1837, pp 84 139 Japan) BOLLENGER, Cat. Sn. Brit. Mus., II, 1894, p. 59 (Yokohama, Nikko; Miyanoshta; Kumamoto, Satsuma, Gensan, Korea Borttger, Kat. Schl Mus Senckenberg , 1898 p 53 Nikko, Yezo Watt, Proc Zool. Soc. London, 1903, p. 100 Japan 1905, II, p. 514 Hondo; Yaku Is).-WERNER, Abh Bayer Akad Wiss Muenchen, H Klasse, XXII, Pt. 2, 1904, p 357 (Hankow, China).—Nikoleki, Zap. Imp. Akad Nauk,

h Figa 277 378

[«]Type of C riegatus

[#] Houlesger Cal. If p 54.

Boulenger Cd II p 55.

S Peterburg (8), XVII. No. 1, 1905 p. 263 (Japan Unzen; Hongkong) — Compsosoma quadretirgation Dumeril and Bibron Erpet Gen VII Pt. 1, 1854 p. 301 Japan) Elaphis quadretirgation Generals Cat Colubr Sn. Brit. Mus., 1858, p. 94 Japan. Jan. Icon Ophid. Ity 24, 1867, pl. 1, fig. 1. Japan) Hittenhoure, Suz. Ber. Gen Naturf Fr. Berlin. 1880, p. 114 (Hakodadi, Tokyo, Nambu, N.E. Hondo) Okada, Cat. Vert. Japan, 1891 p. 68 (Tokyo, Hakone, Nu shima. Kozeshima; Awaji. Suwo, Yezo. Elaphis quadri regata Martens. Preuss Exped. Ost-Asien, Zool., I, 1866, p. 112 (Nagasas). 1876, p. 379 (Yokohama). Hitgendorf, Mitth. Deutsch. Ges. Ost-Asiens, I. heft. 10, 1876, p. 30, Yezo, Tokyo. Fritze, Mitth. Deutsch. Ges. Ost-Asiens, V. heft. 46, 1891, p. 238 (Yezo).

1826 Colliber vulneratus Hote, Isis, 1826, p. 212 (type-locality, Japan; Blomhoff, collector).

1837 Coluber rargatus TEMMINCK and SCHLEGEL, Fanna Japon . Rept . Ophid .

pl 14 error, not of text.

1860 Elaphis bilineatus Hallowell, Proc Phila Acad., 1860, p. 497 type-

locality Volcano Bay Yezo; Doctor Morrow collectors

1860 Leptophidium dorsale Hallowell Proc Phila Acad. 1860, p 498 type-locality, Hakodate, Yezo; Stimpson collector.

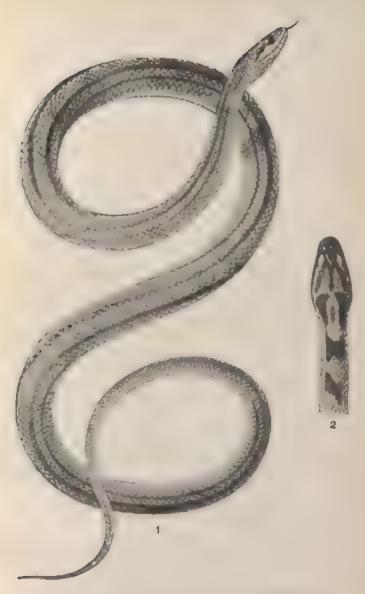
1867. Elaphis quadricingatus var interrupto Jan. Icon Ophid live 24, pl. 1, fig. 2 cover p 2 (type locality Japan, type in Mus Milano)

1867. Elaphis quadrivegatus var atra Jax from Ophid livr 24 pl. t. fig. 3 cover p. 2 ctype-locality, Japan; type in Mas. Milano. Coluber quadrivirgatus var. atra Boetricer, Kat. Schl. Mus. Senekenberg, 1898, p. 53 (Japan)

I have no doubt that Leptophidium dorsale, Hallowell is correctly referred here as a synonym. The type seems to be lost, but I have before me a young E. quadrivirgata from Yezo (U.S.N.M. No. 23435), which agrees with Hallowell's description in every particular, except in the number of ventrals (100, which of course is erroneous and probably a misprint for 200) and in the shape of the pupil which Hallowell says is "ovoid," but the latter statement is easily accounted for.

Description (figs. 279–281). Adult female: U.S.N.M. No. 31819; Yamagawa, province of Satsuma, Kiusuu; June 14, 1903; Dr. Hugh M. Smith, collector. Rostral much broader than high, visible from above; internasals about as long as broad, smaller than prefrontals which are broadly in contact with supraocular; frontal as long as its distance from tip of snout and as the interparietal suture, broader in front than behind; parietals one-fourth longer than distance of frontal from tip of snout; nostril large, roundish between two subequal nasals, loreal squarish, about as high as long, one preocular, not in contact with frontal; one subpreocular; two postoculars; temporals 2+3; supralabials eight, fourth and fifth entering eye; five lower labials in contact with anterior chin-shields which are of the same length as the posterior; 19 rows of scales, the 11 median faintly, but distinctly keeled, the outer four on each side smooth; ventrals 203, obtusely angulate laterally; anal divided; 87

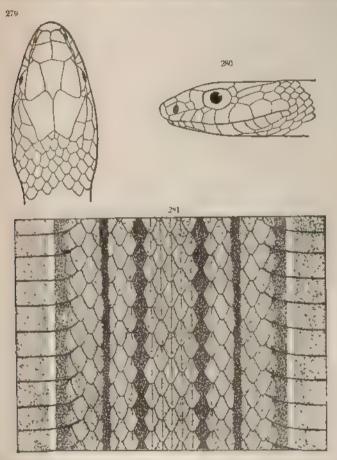
a Reproduced in this work on Plate XXI.



ELAPHE QUADRIVIRGATA. FROM TEMMINCK AND SCHLEGEL FOR EXPLANATION OF PLAYE SEE PAGE 565.



pairs of subcaudals. Color (in alcohol) above tawny-olive, with four longitudinal, dark brown stripes, the outer ones involving the third and fourth scale rows, the middle ones the sixth and seventh scale rows; the lower stripes end at the vent, the upper ones continue on the tail to the tip; dark brown stripe from eye obliquely backward



Figs. 279-281 \sim 1 Lapur Quadriving at a abult. 13 \times nat size. 279, top of head, 280 of or hatern around the mildle of the body. No 36548, 1 \leq N M

across the eighth supralabial and ending at the angle of the mouth; underside and lower half of supralabials light yellowish.

Inna nsums	
	FT-771.
Total length	. 890
Shout to yent	695
Vent to tro of tul	195

The young may, or may not, have a coloration like that of the adult, a feature to be mentioned more in detail under the head of variation. When unlike the adult, as in Nos. 23435, from Yezo (figs. 282-283), and 34026, from Yokohama, the longitudinal stripes are absent, and

List of specimens of Elaphe quadrivirgata.

	No.	Sex and age.	Locality.	lected.	By whom collected.	Scale rows.	Ven- trais.	Anal.	Subcau- dals.	Tem- porals.	Supra- lablals.
U. S. N. M.	4677	Male	Japan		Doctor Morrow	19	196	61	74	2+3	∞
Do	13754	Young a	do		P. L. Jouy	. 19	. 207	7	88	2+2	x 0
Do	15418	Male	Oide, Shinshiu	Oct,1882	do	. 19	205	7	•	2+3	∞
Do	15419	do	Near Tokyo	Apr. 12,1883	do	. 19.	205	7	88	2+2	œ
Do	23433	do	Yezo		F. Nozawa	. 19	197	63	88	2+3	œ
Do	23434	do.b	do		do	. 19	202	7	25	2+2-3	∞
Do	23435	Young c	do		do	. 19	198	~	28	2+3	40
Do	31819	Female d	Yamagawa, Kiusiu	June 14,1903	Dr. H. M. Smith	. 19	203	8	88	2+3	∞
Do	31873	Male !	Kochi, Shikoku	May, 1903	do	. 19	200	7	88	2+2	∞
Dο	31875	do.h	do	do	do	- 19	200	2	91	2+2	90
Do	31876	do	do	do	do	. 19	205	-	28	2+2	∞
Do	31877	do	do	op.	do	. 19	202	_	88	2+2	œ
Do	31878	do	do	do	do	. 19	214	1	3 8	2+2	∞
Do	33967	Female	Mount Fuji	Aug, 1898	A. Owston	. 19	200	~	82	2+3	∞
Do	33968	do	do	do	do	. 19	202	8	884	2+2-3	∞
Do	33969	Маве	do	do	do	. 19	88	7	8	2+2	•
Do	33970	do	do	do	do	. 19	308	2	28	2+2-3	∞
Do	33971	do	do	do	do	. 19	88	7	88	2+2	∞
Do	33972	Female	do	do	do	. 19	88	2	88	2+2	∞
Do	33973	Halfgr	do	do	do	. 19	201	8		2+5-3	∞
Do	33974	do	do	do	do	19	202	8	87	2+2	∞
Do	33975	Female	do	do	do	- 13	8	7	81	2+3	∞
Do	33976	do	do	do	do	. 19	203	7	83	2+2	∞
Do	33977	do	do	do	do	. 19	205	8	8 6	1+2	∞
Do	33978	do	do	do	do	19	208	81	81	1+2	∞
Do	33979	do	do	do	do	. 19	206	7	8	1+2	∞
Do	33880	do	do	do	do	. 19	202	2	83	2+3	∞
Do	33981	Halfgr	do	op	do	. 19	213		\$	2+2	∞
Do	34004	Female	Yokohama	Apr, 1903	do	. 19	203	2	3	2+2	∞
Do	34006	Male	do	do	do	10	20		***	2+2	œ

				•	•	• • • •			•
34016	Halfgr	Yokohama	. Aug 1886 .	op	 61	_ ₹	- - -	38 1+5	10
34017	Female	do.	. Nov. 2, 1902	ob.	19	203	- 61	83 2+2	∞
34018	Young	Mount Fuji.	. Aug, 1898	ob.	19	202	-2	85 2+2	∞
34019	do	do	do	do	10	205	67	88 2+2-3	∞
34020	do	do.	do	- do	16	205	2	88 2+2-3	∞
34021	do	op.	do	op	19	201	23	2 2+2	∞
34022	do	-do	do	do	19	202	61	9 2+3	7
34026	do	Suruga	. Nov, 1903	ob.	19	202	- 2	11 2+2	∞
34048	Female b	Nagasaki	. Aug, 1901	op	19	186	2	7 2+3	∞
34544	Young c	Isobe, near Yokohama	10	op.	19	202	- 8	6 2+3	∞
36548	Male /	Tokyo			19	200	συ σι	5 2+2	∞
36549	do./	do		do.	19	208	2	2+2	∞
36550	do.0	Nii shima, Idzu Islands		do	19	211	~		∞
	Male	[Okinawa shima?]		Pashiro	19	215	- 8		∞o
88	(4)	Japan			•	508		0	
7	Male '	do.		Leiden Mus	19	808	80	20	
<u>.</u>	do.ť	Yokohama		Challenger Exped	16	Ř	80		•
<u>.</u>	do			ob	19	8	63	3	•
q	Female f	do.		op.	18	200	2	0	•
v	Young '	Nikko		C. Maries.	19	506		0	
7	do.1	do		op	19	200		12	
<u> </u>	do	Miyanoshta		J. H. Leech	16	196		0	•
~	Halfgr i	Satsums		op	19	202	- 7	0	:
~	Female 1	Japan		Leiden Mus	18	200		7	
7	do./	do		do	18	202	-2	8	•
E	Male /	do		700l. Soc	18	203	- 2		:
*	Young 1	dodo		Sir R. Owen	18	203	- 8		•
0	do.j	Kumamoto		J. H. Leach	10	203			•
ø	do.1	do		do	18	306	_ 7	<u></u>	
331.	c Fig. 282-2 d Description	e P. 331. 328. / Scl. Coll.	2. Figs. 279-281.	g No subpreocular. A Fauna Jap. Ophid.,	pl. I.	199		•	
AAAAAWWW	4022 4028 4028 4048 4544 8554 8556 8556 8556 8556 8556 85	: : 九萬: [do.	do.	do do do do do do do do	do. do. <td>do. do. do. do. do. 19 207 do. do. do. do. do. 19 207 Female Suruga. Nov. — 1903 do. 19 208 Young * Isobe,near Yokohama Aug. — 1901 do. 19 208 do. do. Nii shima, Idru Islande Ado. Ado. 19 208 do. do. Nii shima, Idru Islande Ado. 10 208 208 do. do. Nii shima, Idru Islande Ado. Ado. 10 208 Male (A) Japan Teiden Mus 19 208 Ado. do. Yokohama Challenger Exped 19 204 Young (A) Myanoshta J. H. Leech 19 208 Young (A) Myanoshta J. H. Leech 19 208 Halfgr (*) Batsuma Japan Ado. 19 208 Ado. Ado. Ado. Ado. Ado. Ado.</td> <td>do. do. do.<td>do. do. do.</td></td>	do. do. do. do. do. 19 207 do. do. do. do. do. 19 207 Female Suruga. Nov. — 1903 do. 19 208 Young * Isobe,near Yokohama Aug. — 1901 do. 19 208 do. do. Nii shima, Idru Islande Ado. Ado. 19 208 do. do. Nii shima, Idru Islande Ado. 10 208 208 do. do. Nii shima, Idru Islande Ado. Ado. 10 208 Male (A) Japan Teiden Mus 19 208 Ado. do. Yokohama Challenger Exped 19 204 Young (A) Myanoshta J. H. Leech 19 208 Young (A) Myanoshta J. H. Leech 19 208 Halfgr (*) Batsuma Japan Ado. 19 208 Ado. Ado. Ado. Ado. Ado. Ado.	do. do. <td>do. do. do.</td>	do. do.

ELAPHE CONSPICILLATA a (Bose .

DJIMEGURI

Collector: Bigdt Naturk Wetensch, 11, Pt. 1, 1827, p. 262. Schiffelt Phys. Serp., 1837, 11, p. 171 (Japan). Temmisch and Schiegel. Fauna Japon. Rept., 1837, p. 85, Ophid, pl. in (Japan). Hitgenborg. Mittle Deutsch. Ges. Ost-Asiens. I, heft 10, 1876, p. 30. Tokyo. Fritze Mittle Deutsch. Ges. Ost-Asiens. V. heft 46, 1891, p. 239 and seen in Yezo. Bottenar, Cat. Sn. Brit. Mus. 11, 1894, p. 51, Yokohama, Nikko. Harina Hills. Boetteer, Kat. Schl. Mus. Senckenberg. 1898, p. 52. Hondo. Walt., Proc. Zool. Soc. London, 1903, p. 100, Nagasaki., 1905. II, p. 513 (Hondo, Tanega II). Elaphaeconspicillatus Diemenia and Birraos, Erpét. Gén., VII., Pt. 1, 1854, p. 285, southern islands of Japan. Hitgenborg. Sitz, Ber. Ges. Naturf. Fr. Berlin. 1880, p. 114 (Tokyo). Okada, Cat. Vert. Japan, 1891, p. 68. (Tokyo, Osaka, Nikko. Elaphaeconspicillata. Martens., Preuss. Exped. Ost-Asien, Zool., I. 1866, p. 112, 1876, p. 379. Nagasaki.

1860. Proterodon tessellatus Hattowell. Proc. Phila Acad., 1860, p. 499 (type-locality Japa). Dinodon? tessellatus Boullesger, Cat Sn. Brit. Mis. I, 1893, p. 364.

1878 Coronalla perspicillata Mietler, Verhandl Naturf Ges Basel, VI Pt 4, p 595 lapsus

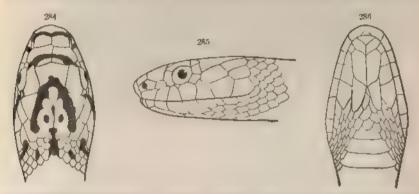
The specimen which served Hallowell for the type of the new genus and species Proterodon tessellatus was probably never entered in the catalogue of the National Museum, and seems to have been lost. Boulenger has referred it, with a query, to the genus Dinodon." but I have no doubt that Hallowell described a fully adult Elaphe conspicillata, which he failed to recognize as such, because of the disappearance of the characteristic markings on head and back. Scale formula, coloration, and all, agree with E. conspicillata. Even the dental formula, as given by him, does not deviate so very far from what I find in my specimens, in which the posterior teeth are decidedly smaller than those preceding them.

Description (figs 284-286). Adult male; U.S.N.M. No. 34025; Mori, near Yokohama; October, 1902; Owston, collector. Rostral very much broader than high, visible from above; internasals squarish, broader than long, much shorter than prefrontals which are in contact with supraoculars, rostral as long as its distance from tip of anout, and longer than interparietal suture, twice as large as the rather narrow supraocular; parietals much longer than distance of frontal from tip of snout; nostril large, rounded, between two nasals, of which the posterior is considerably larger than anterior; loreal rather small, wider than high; one preocular not in contact with prefrontal; no subpreocular or subocular; two postoculars; temporals large.

^{**}Signifying spectacled, from conspicilla medieva. Latin for a pair of spectacles; referring to the black markings on the head of the young.

b Cat. Snakes Brit. Mus., I, 1893, p 364.

1+2; supralabials 7, sixth largest, third and fourth entering orbit; four lower labials in contact with anterior chin-shields which are longer than posterior; 21 rows of scales, with feeble keels visible on the middle nine rows; 207 ventrals, scarcely angulate laterally, anal divided; 74 pairs of subcaudals. Color (in alcohol) above uniform drab-gray, the outer seven or eight scales with black bases and lateral margins, and a black spot on the upturned outer portion of every other or third ventral; head above with a few black marks, viz, an inverted V on the frontal and parietal region with a black line on the posterior third of the interparietal suture; three black dots on prefrontals, a black line on the internasals along the suture with the rostral, on the sides of head a black mark on suture between first and second supralabials and another under eye on suture between third and fourth supralabials, this mark coming to the lower lip on the suture between fourth and fifth lower labials; an oblique black



Figs 284-286. Flatherousel Heads. J < Nat Size. 284, for of bead, with color lattern, 285 side of head. 286 independence head. No. 36547, U.S. N.M.

line from postoculars to lip across the middle of the sixth (penultimate) supralabial; underside whitish checkered with bold black spots, underside of tail with a narrow, often interrupted, black zigzag line on the median suture.

Innanaton	,v	
	771	70
Total length.	- 7.	71
Snout to vent	68	23
Vent to tip of tail	1.	48

The young, as a rule, have a much more distinct color pattern, such as No. 6164, consisting of narrow, black, white-edged dorsal cross bands alternating with vertical bars of the same width and color, sometimes divided into two rows of spots: the pattern on the head is much more distinct, and the black lines continuous, the most marked being the inverted V, a curved line on the prefrontals between the eyes, and the black band back of the upper outline of the rostral.

Variation. There is not any great variation in the scutellation. The number of scale rows seems to be constant, 21^{n} , and so is the absence of a true subprecoular (the anomalous scute figured in fig. 285 is really only an accidental subocular separated off on one side from the upper posterior corner of the third supralabial). Temporals are also nearly always 1+2, though Boulenger mentions the occurrence of 2+2. In one of our specimens the anal is undivided; ventrals vary between 200 and 227, subcaudals between 60 and 76. In two specimens there are eight supralabials on one side, in one six. One specimen, No. 34011, is abnormal in lacking the loreal on one side.

In the young there is some apparent variation in the color due to the fact that the strongly marked first color pattern gradually gives way to the uniform tint of the adults. Apparently some specimens retain the early pattern later than others; thus No 31852, although 18 mm. longer than No. 34013, which has nothing left of the original pattern on the back but numerous irregular and scattered black dots, shows the young pattern in its least modified form. These remarks refer chiefly to the pattern on the back, because that of the head remains strong and plain long after the back has become uniform. Some of the head markings remain longer than others, especially the most characteristic ones, viz, the line crossing the penultimate supralabial, the two lines crossing the lips below the eye and between first and second supralabials, and the black postrostral line.

Habitat. Apparently confined to Japan, but not so common as E. quadrivirgata or E climacophora, and comparatively few specimens with definite localities attached are in the museums. The Leiden Museum specimens collected by von Siebold and Buerger probably came from Kiusiu. The Stockholm Museum has a specimen (No. 536) from Nagasaki, collected by Dr. O. Nordquist. The Berlin Museum has it from Nagasaki and Tokyo, and British Museum from Yokohama, Nikko, and the Haruna Hills. Dr. Wall has recently received a specimen from Tanega shima, south of Kiusiu. Our museum, finally, has it from Tokyo, from Oide, Shinshiu, where Jouy collected it in 1882, and from Mount Fuji. Dr. Hugh M. Smith collected it in Shikoku. The only observation as to the altitude attained by this species in the mountains is furnished with a specimen in British Museum, which Lord Dormer collected in the Haruna Hills, 2,500 feet above the sea.

Giglioli and Salvadori record a young specimen as Callopeltis conspicillatus taken by the "Vettor Pisani" expedition at the Avahuna River, Olga Bay, Russian Coast Province, during September, 1879.

⁹ A specimen in the Munich Museum said to have been collected at Hankow China by Doctor Haberer is recently reported by Doctor Werner Abh Bayer Akad Wiss. (Muenchen), II Klasse, XXII Pt. 2, 1904, p. 357) as having 23 scale rows. Altogether it is a very dubious record (see pp. 326, 331).
⁵ Proc. Zool. Soc. London, 1887, p. 595.

Until further details relative to this specimen be obtained it is permissible to suspect that a mistake in identification has been made, and that in reality it is an *E. schrenkii*. I must add, however, that there are several specimens in the Hamburg Museum (Nos. 849-852) collected by Doerries in the "Amurgebiet," which are identified there as *E. conspecillata*.

Lut of specimens of Elaphe conspicillata

	· · · · · · · · · · · · · · · · · · ·		21	214	2 7214	
Do 45417 Mare Old	· · · · · · · · · · · · · · · · · · ·				2 12 14	2 78
		82 l P L. Jouy 903.	21	212	2 1+	2 7
Do 31852 Hadgra Koo	chi Toza, Sh Ma oku		Joh 25	219	2. 731+	2. 7
Do. 34000 Femule Mod	unt Fuji Au	g A Owston	2	227 :	2 67 1+	2 7
10n 34010 dn	do	do do	21	217	1 68 1+	1 7
Do 34011 Male.	do	do do	21	211 :	2 67 1 4	_ 6-7
Do 34012 Femnes	do (do do	21	216 .	2 001+	2 7 8
Do 34013 Halfgr b	du	do do.	21	206; .	2 631+	2 7
	1	902		1		
Do. 34025 Malec., Mon	гі, пеат Уеко — Осі апіл	tdo	21	207	2 741+	2 7
Do 36547 Youngs Tol	kyo	Set Coll_Tol	kyo 21	207 :	2 681+	2 7
Adulte Sap	Just		21	211 :	2 73 1+1	2 87
Brit Mus. o Male?	,do	Lesden Mus	21	219 :	2 87	
Do b Young!	.do	- du	21	217 :	2 56	
Do. / Male / You	kohuma	Challenger I	Ex ZI	215	2 67	
Do d Young / Nik	eleci	do	21	224	2 63	
	runic Bills, 200 feet	Lord Dorme	r 21	206	2: 68	

a Length 488 mm

Genus LiOPELTIS " Fitzinger

- 1843. Laopeltas Firzingka, Syst. Rept. p. 26 type. Herpetodeyas tricolor Schlegeli.
- 1860. Eucypholis Walliameri. Proc. Phila Acad. 1860 p. 403 (type E. semicarinatas).
- Phraquidophis GUENTHER, Ann. Mag. Nat. Hist. 35, IX, p. 126 (type, Cyclophis tricolor)
- 1895 Entechnius Cors., Proc Phila Acad , 1894 p 427 (type Cyclophis major).
- 1900 Entacanthus Coff. Rep. U.S. Nat. Mus. 1898, p. 780 ctype. Cyclophis majory.

d Figs 284 286, Sel Call No. 71

b Longth 470 u in c Description, p. 334

ellatlow type of Proterodon tessellatus,

Boules ger Cat II p 52

a From λείος, smooth πέλτη, a little shield, scale

Lingeltin is almost coextensive with Boulenger's Ablabes (part of Ablabes Duméril and Bibron, 1854 for which he selected A. baliodeirus as the type '='congylosoma Fitzinger, 1843', with the exception of the latter species, which Cope says has hypapophyses present throughout the vertebral column. The species are very difficult to distinguish generically from Elaphe, the chief character being the absence of apical pits to the dorsal scales. These are very obscure in some of the Elaphe, for instance E. rujodorsata, and can only be discovered by a very careful examination of the dry scale. This latter species, therefore, has been referred repeatedly to the genus here treated of.

This genus is mostly oriental in its distribution, extending in the west to the Himalayas and in the south to the Malayan Islands. In China it does not reach farther north than Shanghai and is also unknown in Japan proper. The Chinese species extends, however, to Formosa, and there are two species apparently peculiar to the Rinkins.

KET TO THE RIUKIU AND FORMOGA SPECIES OF LIOPELTIS.

- et. Scale rows 15.

LIOPELTIS MAJOR 4 Guenther.

1856. Cyclophia major Guenther. Cat. Colubr. Snakes Brit. Mus., p. 120 (type-locality, near Ningpo, China; type in Brit. Mus.; Rept. Brit. India, 1864. p. 230 Ningpo: Hongkong pl. xvii. fig. L: Ann. Mag. Nat. Hist. (6). I. 1888. p. 170 near Kiukiang. China .—Ablabes major Boetrger. Ber. Senckenberg. Naturi. Ges., 1894. p. 140 Lueshan Mts., Kiukiang).—Bos Lenger. Cat. Snakes Brit. Mus., H. 1894. p. 279 eastern China; Formora: Proc. Zool. Soc. London., 1899. p. 165 Prov. of Fokien.—Wall. Proc. Zool. Soc. London, 1903. p. 93 Hongkong: Formosa.

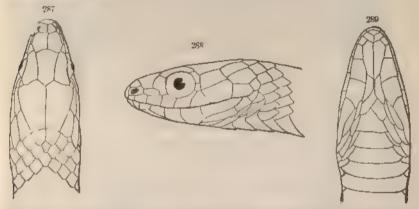
1960. Herpetodryna chloria Hallowell, Proc. Phila. Acad., 1860. p. 503 (type-locality, Hongkong; type, U.S.N.M. No. 7335; Brooke, collector).

Description.—Half grown male; U.S.N.M. No. 7335; type of Herpetodryan chlorin Hallowell: Hongkong Island, China; May, 1854; Mr. Brooke, collector (figs. 287-289). Rostral somewhat broader than high, visible from above; internasals very small, much smaller than prefrontals, which are broadly in contact with supraocular; frontal much longer than its distance from tip of snout, equalling the interparietal suture, slightly wider in front than behind, wider than supraoculars; parietals long, twice as long as the frontal's distance from rostral, followed by two enlarged scales or scutes, which are larger than internasals; nostril large, oval, in the anterior portion of an elongated nasal; loreal much longer than high, about the same

length as nasal but lower; one preocular widely separated from frontal; two postoculars, upper largest; temporals 1+2, large, with straight edges; 8 supralabials, fourth and fifth entering eye, seventh largest, sixth nearly triangular; four lower labials in contact with anterior chin-shields, which are longer than posterior; 15 rows of smooth scales; 163 ventrals, not angulate laterally; anal divided; 86 pairs of subcaudals. Color (in alcohol) above blue, in life bright green; under side white or, in life, yellow.

		Din	enmons		
					mm.
Total length					 684
Snout to vent					 506
Vent to tip of tail				 	 178

A young specimen from the province of Fokien, China, is described by Boulenger^a as having irregular black transverse spots on the nape and anterior part of the back, and traces of an interrupted black lateral streak.



Figs. 287-299.—Lighteltis major 2 x nat. size. 287, for of head; 288, sing of head, 249 thdep side of head. No 7335 U.S.N.M.

Variation. Boulenger describes this species as having a divided nasal, but I can not make out any such division in our specimen. Doctor Wall mentions a specimen having seven labials, with the third and fourth touching the eye on one side. Ventrals range between 163 and 177; subcaudals between 70 and 90.

Habitat. Apparently restricted to the lower Yangtse Valley and coasts of eastern China, between Hongkong and Shanghai, as well as to Formosa, from which island Swinhoe brought four specimens to British Museum. Doctor Wall saw two additional specimens from Formosa in the Hongkong City Hall Museum. In the Chinese province of Fokien it has been found as high as 3,000 to 4,000 feet altitude.

^a Proc. Zool Soc. London, 1899, p. 165,

List of	specimens	of	Laopeltis	major.
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Museum.	No.	Sex.	Locality.	When col-	By whom collected,	Scale rows.	Ventrals Anal.	Subcaudata Temporala,
				1854.				
U.B.N.M	7335	Male*	Hongkong Island	Мау	Brooke	15,	163 2	861+2 8
Brit. Mus	- 1	Female 5	Formosa	'	R. Swinhoe	15	170 _] 2	-86,
Do	ø	do. b .	do		do	(6)	168 2	86
Do	A	do.8.	do		. do	15	176 2	85 .
Do	i	do	do,,,		do	15 i	171 2	52

Description, p. 238; figs. 287-289. Type of H chloris.

^b Boulenger, Cat. 11, p. 279.

LIOPELTIS SEMICARINATA a (Hallowell).

1860. Eurypholis semicarinatus Hallowell, Proc. Phils. Acad., 1860, p. 493 (type-locality, Nafa, Okinawa shima, Riu Kiu; types, U. S. Nat. Mus., No. 7316; Wright, collector).—Ablabes semicarinatus Boulenger, Proc. Zool. Soc. London, 1887, p. 148 ("Loochoo Islands," Pryer, collector); Cat. Sn. Brit. Mus., II, 1894, p. 278 (Great Loochoo Island; Holst, collector; Nagasaki!).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 862; author's separate, p. 13 (Okinawa shima), p. 864; author's separate, p. 15 (Amami-oshima).—Boettger, Offenbach. Ver. Naturk. 33–36 Ber., 1895, p. 115 (Miyakoshima, Yaeyama group); Kat. Schl. Mus. Senckenberg., 1898, p. 78 Wall, Proc. Zool. Soc., London, 1903, p. 101 (Japan; Loo Choos); 1905, II, p. 515 (Okinawa; Amami).

1868. Cyclophis nebulosus Guenther, Ann. Mag. Nat. Hist. (4), I, p. 418, pl.xix, fig. c (type-locality, Nagasaki!; type in Brit Mus.; Whitely, collector).

The two specimens which served Hallowell as types for this species are still in the United States National Museum (No. 7316) in a fair state of preservation. The scale formulas, as given by him and as counted by me, agree pretty well, but his dimensions do not. He says: Total length, 1 foot 7½ inches; of tail, 4 inches, five lines [Pied du Roi], the equivalents in mm being about 536 and 118. The two specimens, as measured by Mr. Paine, my assistant, are: Total length, 492 and 564 mm.; tail, 107 and 122 mm., a considerable discrepancy. The means of the two specimens, however, viz, 528 and 115, are so near Hallowell's figures that it may be regarded as certain that the latter are not intended to represent the dimensions of the individual snake.

An examination of the type of Guenther's Cyclophis nebulosus, which I was permitted to make in 1898, fully confirms Boulenger's view that it is only the young of the present species. The young specimen collected by Holst in Okinawa shima has the frontal shield considerably larger than Guenther's type, but is otherwise indistinguishable, and a young specimen from Miyakoshima of the Saki shima group now before me and described below is also similar. The alleged

a Signifying half-keeled, the scales of the body being only keeled in their anterior half.

habitat of the type of *C. nebulosus*, which is said to have been "obtained by Mr. Whitely at Nagasaki" is undoubtedly erroneous, and it is almost certain that all the birds and reptiles recorded as obtained by him at that place were not actually collected there. They are of much more southern origin, most probably from some group of the Riu Kius.

Description. Young—Science College Museum, Tokyo, Japan, No. 15; Miyakoshima, Saki shima group: figs. 290-292 — Rostral about as broad as high, visible from above; internasals very small, the suture between them less than one-half the suture between the prefrontals; frontal much longer than its distance from the tip of the snout and equally suture between parietals; nostral large, extending nearly the entire height of the nasal; loreal trapezoidal higher behind, slightly longer than high; one preocular not in contact with frontal; two post-



Figs 200-202 — Liopeltis semicarinata | 2 + nat size | 20, top of head, 201 side of head, 202, Coderside of head | No. 15, 8, 1, Cold. Tokyo.

oculars; temporals 1 + 2, large; eight supralabials, seventh and eighth largest, sixth rather smaller than fifth, fourth and fifth entering eye; four lower labials in contact with anterior chin-shields, which are as long as the posterior, 15 scale rows, median nine rows with a slight indication of keel at the base, outer three on each side smooth, all without apical pits; ventrals, 189; anal divided; subcaudals, 80 pairs. Color (in alcohol) above olive gray, with numerous obscure "nebulous" spots of dusky on the anterior third of body posteriorly grading into two indistinct dark longitudinal lines on each side, including a paler band about two scales wide, a dusky narrow line frequently interrupted marking the boundary between scales and ventrals; top and sides of head, except labials, uniform olive gray with a minute black spot on each parietal near the middle of the suture between them; entire lower surface and supralabials uniform whitish, the last two with posterior margins blackish.

Inmensions.

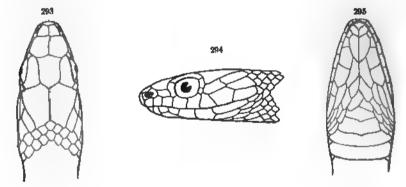
Total length Snout to vent Vent to tip of tail nim 285 2 The adult male (U.S.N.M., No. 7316a; type; Naha, Okinawa shima; November, 1854; Wright, collector, figs. 293-295) is in all essential features of scutellation like the one described above, except that the snout is proportionally more elongated, with resulting longer internasals and longer loreal. The coloration is more uniform above, with faint indications of longitudinal dusky streaking, which is very marked on the side of the neck as interrupted longitudinal black streaks; last two supralabials marked as in the young.

Dimensions.

	mm.
Total length	492
Snout to vent	
Vent to tip of tail	107

This snake grows to be more than 800 mm. long.

Variation.—Variation both as to scutellation and coloration is rather slight in this species. The most noteworthy abnormality is presented by U.S.N.M., No. 11127, which has the fifth supralabial on



Figs. 293-295.—Liopeltis semicabinata. $2 \times$ nat size 293, for of head 294, side of head, 295, underside of head. No. 7316a, U.S.N.M.

both sides divided by a horizontal suture so as to cut off a large posterior subocular. The number of scale rows, oculars, temporals, and supralabials seems to be absolutely constant, the ventrals and subcaudals vary between narrow limits. The greatest deviation from the normal is shown by the type of *C. nebulosus*, which is said to have only 174 ventrals, while in the other recorded specimens this number oscillates between 185 and 192; the subcaudals vary from 70 to 82.

The most aberrant coloration is shown by one of five large individuals in the Science College Museum, Tokyo. It has four very distinct brown longitudinal stripes on the whole length of the body from nape to vent, while the upper two stripes continue to the end of the tail. These specimens were collected by Mr. Tashiro in Okinawa shima.

Habitat.—Restricted to the Riu Kiu Archipelago. The types were collected during the Rodgers North Pacific Exploring Expedition at

Naha, Okinawa shima, from which island there are now specimens in various museums, thus in Science College Museum, Tokyo, and in the Imperial Museum (Ueno Park), Tokyo, British Museum, and Hamburg Museum (No. 1491), and Doctor Fritze states that it is not rare there in summer. That it also occurs in the southern group is shown by a Science College specimen (No. 15) and two in Museum Senckenbergianum, all from Miyakoshima. Finally, Doctor Fritze enumerates it as one of the species occurring in Amami-ō-shima of the northern group, a statement possibly based upon specimens collected by Doctor Doederlein. Doctor Wall also records three specimens from this island as having been secured by Owston's collectors.

Its alleged occurrence in Japan proper is entirely unsupported. Whitely's specimen, upon which Guenther founded his Cyclopis nebulosus is said to have been obtained in Nagasaki, but all his birds and reptiles credited to that locality most certainly came from some of the Riu Kiu Islands,"

List of specimens of Liopeltis semicarinata.

Museum	Νo	Sex and	Locality	Wher collected	By whom col lected	Beatle rows	Ventrale	404	Subcaudale. Temporats	Labials.
				1854						
USNM.	7316g	Malor.	Near Naba, Oki-	Nov	Wright	15	186	2	77 1+2	6
			miwa shima							
Do	73165	Female 6	do	do	do	1â	190	2	781+2	8
Do	11127	Maler	Тарии*		Perry exped	15	191	2	1+2	8
Do	-8551B	dea	Okanawa ahima		Tasluro. ,	3.5	187	2	1+2	8
Set Coll	15	Young r	Mayakoshima			15	189	2	801+2	8
Tokyo									1	
Brit Mus	a	Made /	Loo Choo laids'		Pryer-collection	15	190	2	821+2	8
Da	b	00./ .	do		do	15	190	2	761+2	8
Do		do f	do	Nov	do	15	190	2	1+2	8
Do	d	Female (do		de	15	192	2	701+2	8
Do		dn /	,do		do	15	187	2	721+2	8
Do	1	Young f	Great Loo Choo L		Holst	15	185	2	76.1+2	8
Do	9	do.#	Nagasuki (")		Whitely	Lv	174	2	74 1 + 2	8
-						_				

a Type, description p. 342, figs. 263, 265

LIOPELTIS HERMINÆ b , Boettgeri.

1895. Ablabes berminae BOETTGER Zool Anz., XVIII, July 8, 1895, p. 269 (typelocality Miyakoshima, Sake shima group Rin Kius, type in Mus. Senckenberg , Offenbach Ver Naturk 33-36 Ber 1895, p. 110 (Miyakoshima); Kat Schl Mus Senckenberg 1898, p. 78 Miyakoshima) BOPLENGER, Cat. Sn. Brit. Mus., 111, 1896, p. 643. WALL, Proc. Zool. Sec London 1903, p. 101 (Loo Choos 1905, II, p. 515 (Iriomete).

Description p 341 figs 290-292.

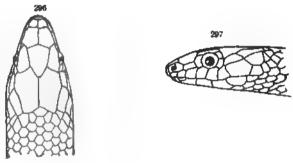
c 1 1142

[/] Boulenger Cat. II p 279. g flordenger type of & urbulasus #Sel Cell No 7

^a See also Wall, Proc. Zool. Soc. London, 1905, II, p. 515, footne

b Named for ?

Description.—Adult male; U.S.N.M.No. 34014; Ishigaki shima, Riu Kiu Archipelago; June, 1899; Owston collection (figs. 296-297). Rostral as high as broad, just visible from above; internasals very small, much less than one-half the size of the prefrontals, which are broadly in contact with supraoculars; frontal as long as its distance from tip of snout and as interparietal suture, broader than supraoculars, considerably broader in front than behind; parietals broad, much longer than frontal; nostril large between two nasals, of which the posterior is much the larger; loreal, long and low, twice as long as high; one preocular widely separated from frontal; two postoculars; 1+2 large temporals; 8 supralabials, fourth and fifth entering eye, seventh largest, twice as high as eighth, which is very small, smaller



Figs. 296-297.—Liopeltis herming. 1½ \times nat size. 296, top of head; 297, side of head. No. 34014, U.S.N \tilde{M}_{\star}

than the temporal immediately above it; four lower labials in contact with anterior chin-shields which are longer than the posterior (on one side, shorter on the other); 17 rows of scales, which are smooth except on the posterior fourth of the body, where they show a faint keel at the base; 162 ventrals; anal divided; 52 pairs of subcaudals. Color (in alcohol) above, olive gray, each scale with an ill-defined median dusky spot near the tip, thus forming faint dusky longitudinal lines; underside whitish, some ventrals with a gray line along the base, and the subcaudals more or less mottled with gray; four median supralabials white, with dark gray sutures, the others olive-gray, like the top and sides of the head.

	-Db	пстион	18.			
					1	ηm.
Total length.					 	745
Snout to vent						610
Vent to tip of fail						135

Variation.—The only noteworthy deviation from the above description shown by the type specimen in the Senckenberg Museum is the two undivided subcaudals following the first two pairs; the ventrals are practically identical in number, while the subcaudals are slightly more

numerous in the type; in the latter the subcaudals have a dark gray longitudinal stripe on each side. Doctor Wall in one specimen counts 47 subcaudals only, and in one he records 19 scale rows "in midbody; anteriorly and posteriorly the normal 17 scales were present." This specimen, from Iriomote shima, has 159 ventrals and 60 subcaudals.

Habitat. Thus far only known from the Saki shima group, Riu Kiu Archipelago. Mr. B. Schmacker's Japanese collector obtained a single specimen in Miyakoshima. Two more specimens in Mr. Owston's collection were recorded by Doctor Wall, one of which is now in the United States National Museum. It was collected in Ishigaki shima, June, 1899. Another is now recorded by him from Iriomote shima.

Last of specimens of Largeltis hermons

Museum.	No.	Sex.	Locality.	When collected	By whom col- beted or from whom received.	Scale rows	Ventrals	Amal	Subcaudals	Tempotals.	Supralabiais.
t'SNM . Senckenberg .	34014 8277a	de b	Ishigaki shima. Miyakoshima n 344 figa 286-3	1899. June	A Owston B Schmacker .	17 17	163;	2		1+2 1+3	85 86

Genus PTYASª Fitzinger.

1843 Ptyas Fitzingen, Syst Rept., p 26 (type, Coluber blumenbachii=C mu-

1854 Coryphodon Di Méril and Bibros, Erpét Gén, VII, Pt. 1, p. 180 (part)

The two species, in the East known as rat-snakes, may be easily distinguished thus:

PTYAS MUCOSUS b (Linnæus).

• 1758. Coluber mucasus Linnells, Syst. Nat., 10 ed., I, p. 226 (type-locality, "in Indias" (ype in Roy. Mus. Steckholm). 12 ed., I. 1766. p. 388. Ptyas mucasus Coff., Proc. Phila. Acad. 1860. p. 563. Glenelle, Rept. Brit. India 1864. p. 249. South continental Asia. Formosa. Zamenis mucasus. Bollekger, Cat. Sn. Brit. Mus., I. 1893. p. 385 (south Asia. Formosa).—
Boettraen, Kat. Schl. Mus. Senekenberg., 1898. p. 41 (Taiwan fu, Formosa). Anderson, Bib. Syensk. Vet. Akad. Handl., XXIV, Pt. 4, no. 6, 1899. p. 25. (type). Wall. Proc. Zood. Soc. London, 1903. p. 90. (Hongkong.).

⁶ From πτὖάς, a kind of snake, so named by the author Greeks from its hissing or spitting (πτὖω)

b Signifying slimy - The gender of Ptyus is fen in me, but as Cope, and all authors after him, have treated it as masculine, it is here so considered

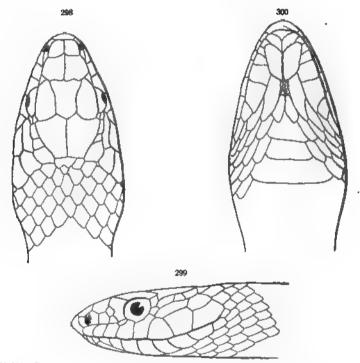
1820. Coluber blumenbachii Merrem, Syst. Amph., p. 119 (type-locality, Bengal).—Coryphodon blumenbachi Jan, Elenc. Ofid., 1863, p. 64 (Bengal; Ccylon; Japan); Icon. Ophid., livr. 24, 1867, pl. 111, figs. 2-3 (Ccylon; Bengal).

1839. Coluber dhumna Canton, Proc. Zool. Soc. London, 1839, p. 51 (type-localities, Carnatic, Orissa, Bengal, Nepal, Assam, Arracan, Tenasserim).

1860. Leptophis trifrenatus Hallowell, Proc. Phila. Acad., 1860, p. 503 (type-locality, Hongkong, type, U.S.N.M., No. 7510).

1867. Coryphodon blumenbacht var. carinata Jan, Icon. Ophid., livr. 24, pl. III, fig. 4 (type-locality. "Japan," type in Mus. Genova) (not C. carinatus Guenther, 1858).

Description.—Adult male; U.S.N.M. No. 7510, type of Leptophis trifrenatus: island of Hongkong; April, 1854; Lieutenant Brooke,



Figs. 298-300. -PTVAS MUCOSUS (TYPE OF TRIFRENATUS). NAT SIZE. .98. TOP OF HEAD; 200, SUDE OF HEAD. 300, UNDERSIDE OF HEAD. NO. 7510, U.S.N M

collector (figs. 298–300). Rostral broader than high, somewhat projecting; internasals as long as broad, much smaller than prefrontals, which are in contact with supraocular; frontal as long as its distance from rostral and as the interparietal suture, much broader in front than behind, the lateral edges distinctly concave; supraocular large, as wide as the frontal at its lateral convexity; parietals broad, as long as the distance of frontal from tip of snout; nostril large, vertically elliptic between two subequal nasals; three loreals, one larger anterior followed by two smaller, one above the other; one preocular not in contact with frontal; a subpreocular; eye rather large, its diameter

equaling its distance from nostril; two postoculars; 2+2 temporals; eight supralabials, seventh and eighth largest, fourth and fifth entering eye, fifth narrow and high, in contact with lower postocular and lower anterior temporal; five lower labials in contact with anterior chinshields which are shorter than the posterior; one pair of postgeneials; 17 rows of scales, the middle three of which are feebly keeled, the others quite smooth; 190 ventrals; anal divided; 111 pairs of subcaudals. Color (in alcohol) tawny with irregular narrow cross lines of black which is confined to the edges and tips of the scales; head above uniform, sides paler, labials and temporals edged behind with brownish black; underside whitish, the ventrals marked with a narrow brownish line at the posterior margin, becoming darker and broader behind, and in addition every fifth ventral has on each side a sharply defined, narrow dark brown bar along the base or anterior margin.

	Dimenno	77.0.		
				70 74
Total length			 	1, 665
Snout to vent				1, 250
Vent to tip of tail				415

The young are said to have usually light cross bands on the front half of the body.

Variation Ventrals are recorded as varying between 187 and 208, subcaudals between 95 and 140. The number of loreals is somewhat variable, and Doctor Wall records one specimen with nine supralabials on one side, fifth and sixth touching the eye.

This species grows to be more than 2 meters long.

Habitat The rat-snake has a wide distribution over the entire southern continental Asia. In the Himalayas it is found at an altitude of over 5,000 feet. In southeastern China it occurs from Hainan to Chusan. Swinhoe collected two specimens in Formosa, where, according to Guenther, the species is not rare. These specimens are in British Museum. A third specimen, from Taiwan fu, South Formosa, was sent by Mr. Schmacker to the Senckenberg Museum

The locality of the specimen in the Genova Museum, upon which Jan based his variety carinata and which is said to have come from Japan, is undoubtedly erroneous.

List of sperimens of Ptyas mucosus,

1 S N M No	Sex	laculity	When collected	By whom collected	Seute rows	tentrals.	Anal	Sulvandals.	Temporals.	Supralabl-
7510	Males .	Hongkorg Cham	Apr. 1854	Liculcount Brooke	17	190	2	111	2+2	8

[&]quot;Type of Hallowell's Leptophis traffengius Description p 340 figs 298-300

PTYAS KORROS @ (Schlegel).

1837 Coluber cancellatus Oppet in Schlegel's Phys Serp., II, p. 139 (specimentable) in Paris Museum)

Description. Adult; U.S.N.M. No. 26233; Trong, Lower Siam, Malay Peninsula; Dr. W. L. Abbott, collector. Rostral slightly broader than high, visible to a considerable extent from above; internasals slightly broader than long, smaller than prefrontals, which do not quite touch the supraoculars; frontal longer than its distance from rostral, and longer than the interparietal suture, much broader in front than behind, the lateral outline quite concave; supraoculars narrower than frontal at its narrowest point; parietals broad and truncate behind, their length equaling the distance of the frontal from tip of snout; nostril large, vertically elliptic, between two nasals, the anterior of which is slightly larger; two loreals, the anterior largest. as high as long, in contact with preocular above the posterior loreal, which is rather small; one preocular, barely in touch with frontal. one subpreocular; eve large, its diameter equaling its distance from center of nostril; two postoculars; 2+2 temporals; eight supralabials, seventh largest, fourth and fifth entering eye, fifth not in contact with temporal; five lower labials in touch with anterior chinshields, which are shorter than the posterior; 15 rows of smooth scales; 161 ventrals; anal divided; 140 pairs of subcaudals. Color (in alcohol) above anteriorly olive, each scale with a faint submarginal dusky line, on the posterior half of the body becoming gradually tawny olive, the dark lines becoming marginal and black; no distinct marks on head; sides of snout and six anterior supralabials pinkish buff; whole underside uniformly whitish suffused with pinkish buff.

Dimensions. The specimen described is a skin in alcohol, the total length measuring about 1,210 mm.

Boulenger measures one specimen in British Museum as follows: Total length, 1,500 mm.; tail, 600 mm.

The young are said to have transverse series of pearl-colored spots forming cross bands.

Variation. The number of loreals is commonly two or three, but Doctor Wall reports one Chinese specimen having only one loreal on

[&]quot;Korros, according to Schlegel himself as the Javanese name for another snake. Elaphe melanurus and was wrongly applied by him to the present species.

both sides The number of ventrals varies between 161 and 177, the subcaudals between 122 and 145. Doctor Wall gives the latter as 110-116, but some error seems to be involved in this statement, as our five specimens from the Malay Peninsula corroborate Boulenger's figures, there being from 133 to 140 subcaudals. In our six specimens the preocular touches the frontal in only one specimen, namely, the one described above, in all the others the prefrontals and supraoculars are in decided contact.

Habitat — This snake belongs to the group of species which extend from the eastern Himalayas eastward through southern China, in this case at least as far north as Amoy, and southward through the Malay Peninsula to Sumatra and Java.

It is admitted to the fauna of Formosa on the strength of a specimen stated by Doctor Wall to be in the Hongkong City Hall Museum. The records of this collection, as explained by him, can not now be trusted, and while it is true that no other collector has obtained it there, the general distribution of the species is such as to make its occurrence in Formosa probable.

Last of specimens of Ptyas korros.

U.S N M No	Age.	Locality.	When col- lected	By whom collected	Scale rows	Ventrals	Amal	Subcauduls.	Temporals	Supratahata
26233	Adult a	Trong Lower Siam		Dr W. L. &bbott	15	101	2	140	2+2	8
22877	do	do		do	15	174	3		2+2	8
92878	do	do		do	18	115	2	133	3+2	8
22879	do	do		do	15	174	2	138	2+2	8
22880	do	do		do	15	172	2	1.6%	2+2	В
22953	do	do		do	15	168	- 2	137	2+3	8

[«] Description, p. 348

Genus ZAMENISª Wagler.

- 1830. Zamenis Wagier, Nat. Syst. Amph., p. 188 (type, Coluber ciridiflacus)
- 1843 Eremiophia Fitzingen, Syst Rept , p 25 type, (trabalis
- 1843. Hierophia Fitzingen, Syst. Rept., p. 26. type, C. ciruliflacus;
- 1862. Tyria Core, Proc. Phila. Acad., 1862, p. 338 (substitute for Zaments) (not of Fitzinger, 1826).

ZAMENIS SPINALIS b (Peters).

1866. Masticophis spinalis Peters Mon Ber Berlin Akad Wiss, 1866, p. 91 (type-locality, "Mexico," (type in Berlin Mus Morles dorff, Journ N. China Br. R. Asiat Soc. n. s.), XI 1877, p. 104. Peking). Zamenos spinalis Guesther Ann. Mag. Nat. Hist., 4), IX, 1872, p. 22. N. China.

a From Canerns trascible

b Signifying pertaining to the spine, or backbone, with reference to the yellow, black-edged vertebral line.

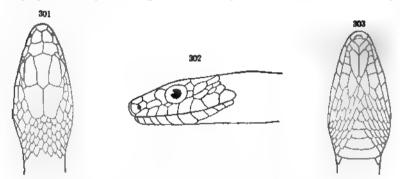
STRAUCH, in Przewalski's Mongoliya i Strana Tangutov, III, 1876, p. 46, pl. viii (Ala-shan Desert). -Mueller, Verh. Naturf. Ges. Basel, VII, Pt. 3, 1885, p. 681 (Mongolia).--Boulenger, Cat. Snakes Brit. Mus., I, 1893, p. 394 (Korea; north China; Hainan). -Wall, Proc. Zool. Soc. London, 1903, p. 91 (Yangtse Valley; Huangtsun, N. China).--Werner, Abh. Bayer. Akad. Wiss. (Muenchen), II Klasse, XXII, Pt. 2, 1904, p. 355 (Tsingtau, China).--Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, No. 1, 1905, p. 226 (Ala-shan; Ordos).

1866. Zamenis bocourt: Jan, Nouv. Arch. Mus., Paris, II, 1866, Bull., p. 6 (type-locality, Siam, type in Paris Mus.; Bocourt, collector).

1867. Zamenis cataphoranotus Jan, Icon Ophid., livr. 23, pl. II, fig. 2 a (type-locality, Bangkok, Siam; type in Paris Mus.).

There being no specimen of this species in our collection, I give the following somewhat condensed account of the type specimen derived from Doctor Peters's original description.

Description (figs. 301-303).—Adult; Berlin Museum; type; "Mexico" (erroneously). Shout projecting, rounded; prefrontals broader than long, not longer than internasals; frontal very long, anteriorly broad and very obtusely angulate, the lateral outline forming a shallow concavity, posteriorly forming an acute angle with rounded apex; supra-



Figs. 301-303.—Zamenis spinalis. Finlarged. 301, for of head, 302, side of head; 303, undreside of head. From Jan, I on Ophid, Liv 23, pl. ii, pig. 2

oculars anteriorly narrower than behind, where they are broader than the frontal at the same point; parietals scarcely longer than frontal, rounded behind; nostril between the upper part of the two nasals; loreal trapezoid, longer than high, preocular not in contact with frontal; one subpreocular; two postorbitals; temporals 2+2 on left side, 1+2 on right, the upper anterior temporal on this side being coalesced with the parietal; eight supralabials, fourth and fifth entering eye; five lower labials in contact with chin-shields, of which the posterior are slightly longer than the anterior; 17 rows of smooth scales; 203 ventrals; anal divided, 96 pairs of subcaudals. Color, above olive greenish brown; a yellow black-bordered longitudinal line beginning near the anterior end of the frontal along the middle of

the back nearly to the end of the tail, occupying the median dorsal scale row and the adjacent halves of the rows on either side; an indistinct cross band at the perterior edge of the prefrontals, precedurs and postoculars, an indistinct narrow longitudinal band on the temporals, the greater part of the supralabials and the whole underside yellow; on the upper part of the supralabials a black irregularly serrated band which is interrupted on the fifth supralabial and again appears, though narrower, on the posterior portion of the neck; a black spot anteriorly on the lateral angle of each ventral; an indistinct blackish line on the end of the ventrals and that part of the first scale row lying between them, the scales themselves white in the middle so as to form a pale longitudinal line above the black one.

	Pimensions	
		tam.
Total length		835
Snout to vent		615
Vent to tro of tail		220

Variation. This species seems to be subject to the usual variations, such as "preocular separated from or just touching the frontal," "temporals 1+2, 2+2, or 2+3." Boulenger says: "Eight (exceptionally nine) upper labials, fourth and fifth (or fifth and sixth) entering the eye," basing his diagnosis on four specimens, while Doctor Wall, who apparently examined 11 specimens, probably mostly from the Yangtse Valley, says that the normal arrangement is nine, with the fifth and sixth touching the eve, and that only two specimens had eight supralabials. He also mentions one specimen with two loreals, one behind the other, and one with the subpreceular absent on one side; two specimens had four lower labials in contact with anterior chin-shields on both sides. All his specimens had 2+2 temporals. With regard to the number of supralabials, it may be added that Doctor Werner in the two females, from Tsingtau, examined by him It is greatly to be regretted that the exact localities of found eight the other specimens recorded have not been given with each individual scale formula. Minimum of ventrals recorded by Doctor Wall is 179; maximum by Doctor Werner is 211; subcaudals both minimum and maximum by Doctor Wall is 84 and 100,

Habitat. This species was originally described as from Mexico, but it has since been discovered that its real habitat is eastern Asia, where it is recorded from Siam, the island of Hainan, the Yangtse Valley, and from northern China, Mongolia, and Korea. A specimen from the latter country is in British Museum.

List of specimens of Zamenis spinalis.

Museum	No	Sex i	Locality	When col-	By whom record	od.	Scale rows,	Ventrals.	Anal	Caudula.
St. Petersh			Ala-shun Desert		Strauch, Le., p. 48		17	180	2	98
Berlin		(9)	"Mexico"		Peters		17	203	2	96
British	a	Female	Korea		Boulenger, Cat. Lp.		17	198	2	85
Do.	ь	Male	Near Peking.		do		17	199	2	99
Do	c	, de	North China		do.		17 1	192	2	90
Do	ď	dn	Hainan		do		17	198	2	
Munich		Female.	Tsingtau		Werner, I c	,	17	210	2	90
Do		do	do		.do .		17	211	2	91

Type; description, p. 350.

Genus ZAOCYSª Cope.

- 1860 Zaocys Cope, Proc. Phila. Acad., 1860, p. 563 (type, Z. dhumnades).
- 1864. Zapyrus Guenther, Rept. Brit. India, p. 256 (type, Z. fuscus).
- 1891. Zaccys W. L. Sclater, Journ. Asiat. Soc. Bengal, Nat. Hist., LX, p. 238 (error typogr.).

ZAOCYS DHUMNADES b (Cantor).

- 1842. Coluber dhumnades Cantor, Ann. Mag. Nat. Hist., IX, p. 483 (type-locality, Chusan, China; type in Brit. Mus.; Cantor, collector).—Zaocys dhumnades Cope, Proc. Phila Acad., 1860, p. 563 (Ningpo).—Guenther, Rept. Brit. India, 1864, p. 256, pl. xxii, fig. A (Chusan, Ningpo). Boulenger, Cat. Snakes Brit. Mus., I. 1893, p. 375, pl. xxvi. fig. I (Southern China).—Wall, Proc. Zool. Soc. London, 1903, p. 90 (Shanghai; Yangtse Valley).—Werner, Abh. Bayer, Akad. Wiss. (Murnchen). Klasse II, XXII, Pt. 2, 1904, pp. 357-364 (China), 372, footnote (Tamsui, Formosa).
- 1854. Ablabes viltatus Dumériu and Bibron, Erpét. Gén., VII., Pt. 1, 1854, (p. 326) (type-locality, China, type in Paris Mus.; Montigny, collector).
- 1858. Coryphodon carinatus GUENTHER, Cat. Colubr. Snakes Brit. Mus., p. 112 (part: Chusan).

Having no specimen of this species for description, I submit the following diagnosis taken from Boulenger:

Description.—Rostral broader than deep, visible from above; internasals shorter than the prefrontals; frontal once and one-fourth to once and a half as long as broad, as long as or a little shorter than its distance from the end of the snout, a little shorter than the parietals; loreal longer than deep; one preocular, with a subocular below it; two postoculars; temporals 2+2 or 2+1; eight upper labials,

⁴ From ζα, a prefix meaning very; and ωκές, swift.

b Cantor gives no explanation of the name. Perhaps he meant to indicate a snake being like his Coluber dhumina (= Ptyas mucosus), the name of which in Hindu is said to be dhamin.

Cat. Snakes Brit. Mus., 111, p. 375.

fourth and fifth entering the eye; five lower labials in contact with the anterior chin-shields, which are shorter than the posterior; scales in 16 rows, the two median strongly keeled; a second dorsal pair may be feebly keeled; ventrals 187 194; anal divided; subcaudals 108-116. Color, anterior half of body olive above, with black edges to the scales and a yellow or orange, black-edged vertebral stripe; upper lip and belly yellow, the olive of the upper parts extending down to the ends of the ventrals; on the posterior part of the body the upper surfaces turn to black and the lower to dark olive or gray.

		Demensions.		m111.
Total length			 	1, 950
Shout to yent				1 420
Vent to tip of ta	4		 	530

Variation. Doctor Werner has counted as many as 120 subcaudals in a Ningpo specimen and Doctor Wall as few as 96; the latter also gives 199 as maximum of ventrals observed by him. He also notes the following variations: Loreal, in one specimen two superposed shields on one side; temporals, a single anterior in one specimen on one side; anterior chin-shields in contact with four lower labials on both sides in one specimen.

Habitat. Southern China, from Shanghai to Hongkong on the coast west to Lun-ngan fu, province of Sze-chuen, in the interior.

Doctor Werner has recorded its occurrence in Formosa on the strength of a specimen in the Museum of the Munich Academy of Sciences, said to be from Tamsui.

Genus HOLARCHUS* Cope.

1854. Simotes Dumerill and Bibron Erpét Gén., VII., Pt. 1, p. 624 (type, S. russelii = arnensos not of Fischer, 1817)

1887. Holarchus Cove, Bull U.S. Nat. Mus., No. 32, p. 54 (no species mentioned).
1893. Decaular Cove. Amer. Natural., 1893, p. 480 (type, Holarchus temotatus Simotes purpurascens).

The generic name Simotes, by which the snakes of this genus have long been designated is preoccupied by Simotes of Fischer for a group of mammals as early as 1817. It has consequently to be replaced. Cope proposed Holarchus, in 1887, as a term for those species of the genus which have an undivided anal. It is not believed that this character alone, which moreover is not always constant, is sufficient ground for a division of the genus, and as Holarchus is the name next in date after Simotes it must stand for the combined genus.

· From 540s, whole, undivided dogós, anus

HOLARCHUS FORMOSANUS a (Guenther).

1863 Simotes swinhous Swinhoe, Ann. Mag. Nat. Hist. (3), XII, 1863, p. 225 (nomen nudum not of Guenther, 1864) (Tamsui, Formosa).

1872. Simoles formosanus (rt enther Ann Mag. Nat. Hist (4) IX, Jan. 1872, p. 20 (type-locality, Takao, Formosa, type in Brit. Mus., Swinhoe collector). Fischer, Abh. Naturw. Ver. Hamburg, IX, 1886, p. 12 (south Formosa; Oldenburg Mus. Ruhstrat, collector). Mueller. Verh. Naturi Ges. Basel, VIII, Pt. 2 4887, p. 263 (south Formosa). Boettger, Offenbach. Ver. Naturk, 26-28 Her., 1888, p. 129, Kat. Schl. Mus. Senckenberg., 1898, p. 73 (Hainan I., China). -Boulenger, Cat. Sn. Brit. Mus., II., 1894, pp. 222, 359, pl. viii, fig. 2 (Takao, Formosa; Swatow, China); III, 1896, p. 640 (central Formosa). Stejneger, Journ. Sci. Coll. Tokyo, XII, Pt. 3 1898, p. 221 (Taipa, Formosa). -Schenkel, Verh. Naturi. Ges. Basel, XIII, Pt. 1, 19., p. 161.

1878 Simotes bicatenatus Mueller, Verh Naturf. Ges. Basel, VI, Pt. 4, 1878, p. 595 (Fumun, Prov. Kanton, not of Guenther)

1894 Samotes hainanerus Buettuer, Ber. Senckenberg Naturf. Ges., 1894, p. 133, pl 111, figs 2a c (type-locality, Hainan; type in Mus. Senckenberg.; Schmacker, collector).

Sauvage in 1877 has described a Simotes from China as S. vaillanti.^b The chief points of difference seem to be the double anal and single preocular, but as these characters are not absolutely constant in S. formosamus it may possibly turn out to be the same species.

This species seems also closely allied to *H. violaceus* which occurs on the continent from Bengal to southern China, and which differs chiefly in having only 17 scale rows and fewer subcaudals. The two species appear to occur together in some localities, thus, for instance, in Hainan.

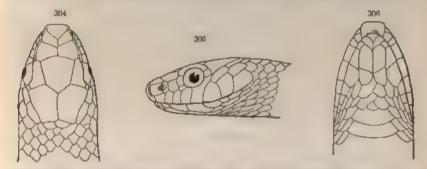
Description.—Adult male: Science College Museum, Tokyo, No. 17A.; Taipa, Formosa: September, 1897; T. Tada, collector (figs. 304–306). Rostral higher than broad, projecting, turned over on top of the snout, the portion visible from above nearly as long as the internasal and prefrontal sutures, internasals oblique, much broader than long, smaller than prefrontals, which are in contact with supraocular; frontal very large, twice as broad as supraoculars, nearly as broad as long, longer than distance from tip of snout, and nearly as long as parietals, which are broad and truncate behind; nostril round, between two nostrils of which the anterior is much the larger; loreal higher than long, one preocular, not in contact with frontal; one subpreocular; two postoculars, the lower ones on both sides in this specimen abnormally coalesced with fifth supralabial; temporals 1+2, on right side an additional small anterior temporal; eight supralabials, all higher than long, the first three lower, the fourth suddenly higher, sixth,

g From Formosa.

b Bull Soc Philom, Paris (7), I, p. 107.

c Cope's Holarchus dolleyanus (Proc. Phila. Acad., 1894 (publ. 1895), p. 423, pl. x, fig. 1), with 17 scale rows and 36 subcaudals, seems to belong to Holarchus violaceus.

seventh, and eighth largest, fourth and fifth entering eye; three lower labials in contact with anterior chin-shields, which are much longer than posterior; 19 rows of perfectly smooth scales; 167 ventrals. strongly angulate laterally; anal undivided: 46 pairs of subcaudals. Color (in alcohol) above pale drab with numerous narrow and serrate chocolate-brown crossbars dissolved laterally into small spots; a somewhat indistinct longitudinal, median whitish stripe more or less interrupted by the dorsal crossbars; head above more clay-colored with a somewhat intricate symmetrical pattern of brown dark-edged figures which are again outlined by a light edge, viz, an inverted V on the nape with the apex on the interparietal suture; a median figure on frontal like an exclamation mark; an oblique band on each side across parietal, posterior temporals, and hind edge of last supralabial; a pale darkedged line across anterior part of frontal and supraoculars through the eye to the upper lip, crossing the suture between fifth and sixth supralabials; an angular mark with apex toward the nostral on internasals



Figs 304-306.—Holarchus formosanus. 2 x nat. size. 304, top of head, 305, side of head; 306, underside of read. No 17a, Sci. Coll. Tokto.

and prefrontals; and a few dark marks on some of the supralabials; underside whitish shaded with pale drab toward the lateral ventral angle, which is thus marked off as a fairly distinct white line.

Dinenstons	
Total length	179. 149. 108.

The younger specimens, for instance No. 34045, are much darker in coloration, the color above being dark drab with a rufous median dorsal line interrupted by very short, blackish crossbars, sides posteriorly nearly uniform, with a narrow dusky longitudinal line on the fourth scale row; markings on head essentially as in adults.

Variation. Occasionally specimens are found with a divided anal. The parietals in the three specimens examined by me show the curious characteristic of being in contact with the lower postocular

behind the upper one, except on one side in two examples in which the outer part of the parietal is separated off so as to form a small abnormal upper temporal of the first row.

The ventrals, in twelve recorded specimens, vary between 162 and 173, the subcaudals between 46 and 55.

Habitat.—Originally described from the island of Formosa, where it has been recorded from Tamsui, Takao, Taipa, and now from Byoritsu, on the strength of a specimen in the U.S. National Museum recently acquired from Mr. A. Owston. It has since been found in the province of Kwangtung, southern China, and in the adjacent island of Hainan.

			er of operations of a		,, 0, 11, 01, 01, 11, 1						
Museum	No.	Sex and agr.	Locality.	When collected.	By whom collected or from whom received	Scale rows.	Ventrais	Anal,	Subcaudals.	Temporals	Supratablats.
U.S.N M	34045	Halfgr	Byoritzu, Formosa	1903. May 25	A Owston	19	167	1	46	1-2+2	7-8
Do Sci. Coll., Tokyo.	17A	Female. Male 4			T Tada	19 19	165 [63	1	47 53	1+2	8 8

List of specimens of Holarchus formosanus

Genus DINODON a Duméril.

1853. Dinodon Duméril, Mém. Acad. Sci., Paris, XXIII (р. 463), author's separate, р. 67.—Duméril and Bibron, Erpét. Gén., VII, Pt 1, р. 447 (type, D. cancellatum).

1860. Eumesodon Cope, Proc. Phila. Acad., 1860. p. 262 (type, E. semicarinatus).

1860. Lepidocephalus Hallowell, Proc. Phila. Acad., 1860, p. 498 (same type)

1893. Dianodon Cope, Amer. Natural., XXVII. May. 1893, p. 481 (emendation).

The genus *Dinodon* differs chiefly from *Ophites* Wagler ^b in the dentition, inasmuch as the former has a double interruption of the maxillary series, while in the latter only the anterior maxillaries are separated from the posterior series by a single interval.

Description, p. 354. figs. 304-306.

^a From $\delta i \varepsilon$, double, $v \omega \delta \delta \varepsilon$, toothless, referring to the two toothless spaces in each upper jaw.

b This is the correct name for the genus which many authors, including Boulenger, call Lycodon Boie. The latter name appears first in Férrusac's Bulletin des Sciences Naturelles, 1826, p. 238, unaccompanied by any diagnosis, but embracing with certainty only three species then known, namely "Col. andax Daud" C. Hebe Daud.—C. auticus Linn." One of these is the type. In the following year Boie's diagnosis of the genus was published in the Isis, 1827, p. 521, and the type is expressly given as Col. andax. This certainly fixes the name Lycodon beyond a doubt, and it will consequently take precedence over Lycoquathus for the South American snakes of the latter genus. The name next in time for the Asiatic genus is Ophites Wagler (Syst. Amph., 1830, p. 186), which was based on the single species L. subcinctus Boie.

Ophites, which, according to what has been shown, is equivalent to Lycodon, as hitherto limited by Boulenger and others, is not represented with certainty within the territory covered by this work. However, reference must be made to two species which have been credited to it, namely, Ophites albofuscus, of which Guenther says a that it "occurs also in Formosa," the other being Mueller's "Eumesodon carinatus Cope (!)" from Japan.

As to Ophites alboquecus, I have found no further corroborative evidence, and as this species seems to be confined to Sumatra and Borneo, Guenther's specimens probably belonged to some other species. It is then permissible to guess that he referred to the two specimens of Dinodon septentrionale rubstrati, which Swinhoe sent from Formosa.

Mueller's " Eumesodon carinatus Cope (?), Japan, juv." in the Basel Museum," judging from his description of the dentition ("the second tooth and the one before the last are somewhat stouter and longer than the others") is not a "Eumesodon" (Dinodon) at all, but in all probability an Ophites. The description does not exactly tally with any of the known species, but comes probably nearest to O. subcinctus, from which it differs, however, in having smooth scales "except in the sacral region [Lendentheil], where there are three rows of tectiform scales" and two anterior temporals. The most noteworthy similarity is probably that the "upper preocular is fused with prefrontal," a feature quite characteristic of O. subcinctus, with which the rest of the scale formula also agrees, viz. Sc 17; v. 211; a. 1 (exceptional); c. 80. As for the locality, "Japan," it should be noted that it is simply a surmise of Mueller's, based upon the fact that the snake was found in a jar which also contained a Japanese mole (Talpa wogura). The jar, however, was labeled "Java," and Java is just the type locality of Ophites subcinctus. It should be noted, however, that Mueller later referred the specimen to Dinodon orientale (Ophites japonicus).

Dinodon is a very compact little genus of four species. Its center of distribution seems to be China. One species may extend as far west as the Himalayas, one is thus far found only in Hondo, Japan, another in Kiusiu and the Riu Kius, while a third extends from Hainan in the south to Vladivostok in the north.

^a Ann Mag Vat, Hist (4) I, 1868, p. 426

b As to Ophotes [Lycodon] authors see footnote on p. 358.

Cope has given no such name so far as I know; probably Mueller meant E. semi-

d Verh Naturf Ges Basel, VII 1885, p. 685,

c Idem, VIII, Pt. 2, 1887, p. 270.

The genus is not found in any portion of the Malayan region. In the latter it is represented by the genus usually known as Lucodon, a

KRY TO THE SPECIES OF DINODON.

a' Anal entire; a preocular.	
bi Scales smooth, less than 210 ventrals	
c' Ventrals 189 185 209 (average 198), cross-bars of	n body and tail more than
60	D rufazonatum p 35i
^{c2} Ventrals 178-195 (average 189), cross-bars on body i	and tail less than 60
I.), rufozonatum walli, p. 364
b2 Scales feebly keeled, more than 210 ventrals.	
c' Portion of rostral visible from above half as long as	the interprefrontal auture
	D. semicarinatum p. 366

DINODON RUFOZONATUM & (Cantor).

. D septentrionale p 370

....D. orientale, p. 372

^{c2} Rostral just visible from above.

a2 Anal divided, no preocular

1840 Lycodon rufozonatus Cantur, Zool, Chusan (pl. xi) (type-locality Chusan, China, type in Brit Mus , Cantor collector) Guerrier Rept Brit India, 1864, p. 319 (Chusan), Ann. Mag. Nat. Hist. (4), I, 1868, p. 426 (Formosa) -Jan, Icon. Ophid, livr. 36, 1870, pl. iv, fig. 3 (Chusan). STEINDACHNER Sitz. Ber. Wien Akad Wiss Math Naturw Cl LXII. Pt 1, 1870, p 338, author's separate, p 13 (Peking MUELLER, Verh Naturf Ges, Basel, X, Pt. 1, 1892, p. 205 (Vladivostok), -- Dinodon rufozonatus Peters, Sitz. Ber. Ges Naturf. Fr. Berlin 1881, p 89 Bot LENGER, Cat. Snakes Brit. Mus., I. 1893, p 361 , Haman, Formosa. Tsushima, northern China). - Boettger, Kat Schl. Mus. Senckenberg 1898, p. 38 (part Formosa) Wall Proc Zool, Soc London, 1903 pp. 89, 100 (part Formosa, Korea; Taushima).-Werner, Abb. Bayer Akad. Wiss (Muenchen), II Klasse, XXII, Pt. 2, 1904, p. 354 (Ningpo M(s. near Shanghai).

1854. Dinodon cancellatum Dumarit and Bibron, Erpet Gen., VII, Pt. 1, p. 477

(type-locality unknown; type in Paris Mus.).

1856 Coronella struta Hallowell, Proc. Phila Acad 1856, p. 152 (type locality Ningpo, China; types in Phila. Acad. Mus.; McCartee, collector) Eumesodon striatus Cope, Proc. Phila Acad. 1860 p. 263.

1885 Dinodon rufozonatus var. formosana Boerroek, Offenbach, Ver. Naturk 24-25 Ber., p. 125 (type-locality, Formosa, type in Mus. Senckenh., 26-28 Ber., 1888, p. 144 (Formosa).

⁴ Lycodon aulieus (Coluber aulieus LANN.EUS Syst. Nat., 10 ed., I, 1758, p. 220) 18 credited to Formosa by Doctor Wall (Proc. Zool. Soc. London, 1903 p. 88) on the strength of a specimen in the Hongkong City Hall Museum now so labeled He states that the specimen from Hongkong , which Boetiger apon the authority of von Moellendorff, recorded as being in that museum (Offenbach, Ver. Naturk, 26-28 Ber., 1888, p. 84) is found there no longer but, on the contrary, that the only specimen of L. dulicus in that institution is from Formosa. It is greatly to be apprehended that the specimen in question, or rather its label, has been a victim of the typhosa mentioned by Doctor Wall in the introduction to his paper (p. 84). He there expressly states that the circumstances render the accuracy of some of the records open to question In view of the probability that the original Hongkong specimen and the one now labeled as from Formosa are one and the same, I find it madvisable to admit Lycodon aulicus to the fauna of Formosa on the strength of this record. Signifying with red belts, or bands.

Description. Adult male: U.S.N.M. No. 14614; Korea?; Dr. N. M. Ferebee, collector. Rostral about one and a half times as broad as high, the portion visible from above equaling about one-third its distance from frontal; internasals very much smaller than prefrontals, which are broadly in contact with supraocular; frontal short and broad, its length equaling its distance from rostral and shorter than interparietal suture, its width anteriorly nearly equaling its length, and its width at a line through the center of the eves twice as great as that of the supraoculars at the same line; parietals large, twice as long as prefrontals; nostril large, between two nasals, of which the posterior is the larger; loreal twice as long as high, entering eye below the small preocular, which is widely separated from frontal; two postoculars; temporals 2 + 3, the upper one of the second row bordering the parietal very large; 8 supralabials, third, fourth, and fifth entering eye, sixth and seventh subequal, largest; five lower labials in contact with anterior chin-shields, which are considerably longer than the posterior, 17 rows of scales, which are smooth except a few median dorsal rows on the posterior fourth of the body, which show faint keels at the base of the scales: 197 ventrals: anal entire: 71 pairs of subcaudals. Color (in alcohol) pinkish buff (in life said to be coral red) with about 58 broad, dark brown cross-bars on upper side of body and 23 on tail, the bars being separated by narrow bands, about the width of a scale, of the ground color; a series of alternating dark blotches on the sides involving the four outer scale rows and the upturned end of the ventrals; top of head isabella-color with ill-defined pale borders to many of the shields; labials and underside uniform pale, that of the tail with irregular dusky blotches.

Dimensions.

	175.276.
Total length.	1,063
Snout to vent	863
Vent to tip of tail.	200

In a younger specimen, from the country between Tientsin and Peking (No. 29701), all the dark markings are solid black, even the top of the head and the light edges to the head shields are better contrasted. There is, moreover, a somewhat ill-defined black transocular spot from nostril to the temporal region with radiating black edges to the supralabials.

Variation.—With the exception of the scutellation of the sides of the head this snake is not subject to great variation. Thus of 29 recorded specimens only one has 2 scale rows over the normal number, 17.^a The number of supralabials 8 is fairly constant, 7 occurring only

^a Dr. J. S. Thompson, U. S. N., in a letter dated February 9, 1907, informs that he has a specimen from Formosa with 19 scale rows.

rarely. Temporals also are nearly always 2 + 3, but Boettger records a Formosa specimen with 2 + 2 and Doctor Wall one specimen with a single temporal in the first row. He also mentions a specimen with three postoculars on both sides and one with three on one side. greatest variation is seen in the relation of the loreal and the consequent relation of the supralabials to the eye. In our specimens it reaches the eye in one, but not in the other. In 16 Chinese specimens examined by Doctor Wall it touched the eye in 11 and did not reach it in 5, while in the large series of Chinese specimens recorded by Boulenger, viz. 23, the proportion must have been quite different. as in the description of the species he says "loreal elongate, sometimes entering the eye" The resultant variations in the relation of the supralabials to the eye are given by Boulenger as rare, viz, second. third, and fourth, or only fourth and fifth entering eye. The number of lower labials in touch with anterior chin-shield is also subject to some variation, Doctor Wall having found four on both sides in one. and six on one side in two specimens. The normal range of variation in the number of ventrals seems to be between 189 and 209, 185 as recorded by Boulenger in a young Shanghai specimen being quite abnormal; 57 subcaudals in another specimen of the same origin is also considerably below the normal range, which appears to be 62 to 83. It will be noted that the Formosa specimens average a greater number of subcaudals than the specimens from the mainland of China, but the overlapping is not only very great but appears to be uncorrelated with other characters.

The number of dark cross-bars on body and tail varies considerably within the limits of 68 and 99 in the specimens in which they have been recorded, the greatest range being on the body, viz, 50 to 75, as against 18 to 24 on the tail

Habitat. The present species extends over a large portion of eastern China, including the islands of Haman, Formosa, and Chusan, ranging northward at least as far as Vladivostok, from which locality a specimen has been recorded by Mueller as being in the Basel Museum. It also occurs in Korea, but no definite locality has been recorded, the only specimen of certain Korean origin being in the Michigan University museum.

Holst sent two specimens from Tsushima to British Museum.

It has not been recorded from Japan proper. A fine specimen of the continental type, in the United States National Museum (No. 14614), collected by Dr. N. M. Ferebee, U. S. Navy, is credited on the record book to Nagasaki, but there is no original label or any other original document to corroborate this locality of this specimen which came with a collection all the other specimens of which are from Korea. As

a Regarding this locality, see under Elaphe drone, p. 318, footnote,

the entries of that particular time when this specimen was received are not to be entirely depended on, it seems most probable that this specimen was really collected in Korea.

In Formosa the species seems to be common and to agree with the continental form in the number of dorsal spots. British Museum has numerous specimens from the island, the Senckenberg Museum has one, and the Hamburg Museum several collected by Doctor Warburg both in the southern and the northern part of Formosa (Nos. 1526, 1527). Similarly, the museum in Christiania has two specimens collected by Mr. Navara.

DINODON RUFOZONATUM WALLI, a new subspecies.

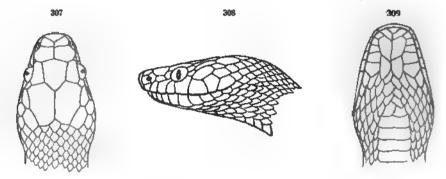
1895. Dinodon rufozonatus Boettiger, Offenbach. Ver. Naturk. 33-36 Ber., 1895, p. 108 (Miyakoshima group, Riu Kius) (not of Cantor); Kat. Schl. Mus. Senekenberg., 1898, p. 38 (part. Miyakoshima).—Wall. Proc. Zool. Soc. London, 1903, pp. 89, 100 (part. Japan, Loo Choos; 1905, II, p. 515 (Miyako; Ishigaki; Iriomote).

Diagnosis.—Similar to typical Dinodon rufozonatum, but with fewer ventrals, viz, 178-195 (average 189), and fewer dark cross-bars on body and tail, viz, 22 to 32 on body and 15 to 20 on tail, or together on both, 41 to 52 (average 45); a pale inverted V on the nape; underside more or less mottled with brown (figs. 307-309).

Type.—U.S.N M. No. 34007; Ishigaki shima, Yaeyama group; June, 1899; Owston collection.

Habitat.—Riu Kiu Archipelago.

Remarks.—While in Frankfort on the Main in 1898 Doctor Boettger had the great kindness to show me the specimens of this species in the



Figs. 307-309. Dinodon rupozonatum walli. $2 \times$ nat size. 307, top of head: 308, side of head. 309, underside of head. No. 11, Sci. Coll. Tokyo.

Senckenberg Museum. Unfortunately, 1 did not have time to examine them in detail, but I made the note that the Formosa specimen appeared to have about twice as many dorsal spots (56 according to Boettger) as those from the Riu Kius. This observation I have had an opportunity to test on only eight additional specimens, but in these I find a similar proportion inasmuch as in five specimens from the southern Riu Kius, the dorsal spots are only 32, 29, 29, 25, and 26, respectively, while in two specimens from Korea and one from northern China, Tientsin, or Peking, the numbers are 75, 58, and 50.

Doctor Wall, who examined a large number of Chinese specimens and four from Ishigaki shima (three of which are the ones now in the

^a Named for Capt. F. Wall, of the Indian Medical Service, author of a Predromus of the snakes hitherto recorded from China, Japan, and the Loo Choo Islands, as well as several papers on Indian snakes.

[§] Science College Museum, Nos. 11–12, and U.S.N.M. Nos. 34006-8.

For further color distinctions, see remarks under Variation, p. 865.

U.S.N.M. mentioned above), as well as one alleged to be from "Japan," made similar observations, and also called attention to the lower number of ventrals and higher number of subcaudals in the latter. The numbers of these plates as given by him do not overlap, but from the tables presented by me (pp. 362 and 366) it will be seen that there is considerable overlapping. While it may thus be inexpedient to give the Riu Kiu form a binominal appellation, there can be no doubt that it should be recognized nomenclatorially.

It appears that all the names in the synonymy of D rufozonatum are based upon Chmese or Formosan specimens with more than 192 ventrals and less than 73 subcaudals. The type localities of D, rufozonatum, D, r var, formosana, and C, striata are known and agree in the scale formula. The type of D, cancellatum is from an unknown locality, but the scale formula as well as the number of black bars on back and tail are conclusive. Hence the necessity of giving a new name.

The number of ventrals and dorsal dark cross-bars being the chief distinctive characters of this subspecies, as indicated above, it appears superfluous to present a detailed description of a Riu Kiu specimen, but a few remarks on the individual variation within the form peculiar to the archipelago may not be out of place.

Variation—In the five specimens before me the loreal is in every case excluded from the eye by the preocular. That this relation is not constant, however, is shown by Boettger's statement that in some of the four Miyakoshima specimens examined by him there is found two preoculars on one side, or on both sides in some, while mostly there is only one. Other variations noticed by him are three post-oculars on one side in one taken found in one of the specimens before me), and only two supralabilities entering the eye in another—Ventrals vary between 178 and 195 in nine recorded specimens; subcaudals between 73 and 87—The largest number of dark cross-bars in five specimens is 52, the smallest 41.

In the youngest specimen before me (Sci. Coll. No. 11) the dark markings on the upper side are nearly solid, though even in this many of the scales in the interior of the blotches have narrow pale edges. In all the other specimens, however, which are much larger, these pale edges are much broader, so that the cross-bars appear lighter brown with dark margins, the paler interior having mostly a streaky appearance.

The typical D. rufozonatum from the mainland seems to have the cross-bars solid-colored,

Habitat. This race seems to be confined to the southern and middle groups of the Riu Kiu Archipelago.

Mr. Tashiro has collected specimens in the Yaeyama group, both on Iriomote shima and on Miyakoshima. The Senckenberg Museum also has specimens from the latter island and the Hamburg Museum from the former (No. 2579). United States National Museum has three specimens from Ishigaki shima, and Doctor Wall examined three more from the same island. Finally, Doctor Warburg also collected it in Okinawa shima. (Hamburg Mus. No. 1545.)

Doctor Wall also mentions a specimen in Owston's collection as from "Japan." No other locality is given, and until further evidence is produced it is permissible to question the occurrence of this species in Japan proper.

List of specimens of Dinodon walls.

Museum.	No.	Sex and age	Locality	When	, By whom col- lected or from whom received	Scale rows	Ventrals	Anal	Subcaudals	Bupralabiale	Dark cross-bars.
				1499.					,		
U.S.N.M	34006,	Male	labigaki shima	June	A Owston.	17	195	1	822+3	8	43
Do	34007	Malea .	Riukiu	do	do	17	190	1	872+3	B	43
Do.	3400%	Female	do	do	do	17	198	1	812+3	8	41
Sei Coll,	11	Young b	Iriomote shims	June 14	Tushiro	17	192	1	85 2 + 3	8	52
Tokyo			Riuklu								
Do.	12	Male .	Miyakoshima		do	17	189		78.2+3	8	44
			Riukhi					и			- *
Senckenb.	7381 0	, c)	, do		B Schmacker	17	17B-	1			
Do ,		(c)	do		.do	17	181	- 1			
Do.		(0)	do		.do.	17	192	1	83.		
Do.		(0)	do		do	17	195	1	81		
							- 2743	ı			
	- 00	%4	4 197-	007 000	- **			400			_

«Туре р. 364.

* Figs. 307-309.

e Boettger, p. 108.

DINODON SEMICARINATUM a (Cope),

ARAMATAH (on OKINAWA SHIMA, According to Mr Tashiro). MATSUTABU (on AMAMI-O-SHIMA, According to Mr. Nakagawa)

1860. Eumesodon semicarinatus Cope, Proc. Phila. Acad., 1860, p. 263 (type-locality, "Loo Choo," type in Phila Acad. Mus., Heine, collector), 1861, p. 75 (identity with L. fasciatus) — Dinodon semicarinatus. Bot Lenger, Ann. Mag. Nat. Hist., (6), X. Oct. 1892, p. 302 (Okinawa shima), Cat. Snakes Brit. Mus., I. 1893, p. 362 (Oho shima, Great Loo Choo Island). — Brown, Proc. Phila. Acad., June 11, 1902, p. 185 ("Loo Choo Islands"). — Walt., Proc. Zool. Soc. London, 1903, p. 100 (Loo Choos); 1905, H. p. 515 (Okinawa, Amami.

1860 Lepidocephalus fasciatus Hallowell, Proc. Phila. Acad., 1860, p. 498 (type-locality, "Japan and Loo Choo," types, I. S. Nat. Mus. No. 7354

The Perry expedition and the Rodgers expedition, according to Hallowell, brought home four specimens of this species, namely, two from "Loo Choo" by the former, two from "Japan" by the latter. One

a Signifying half-carinated, with reference to the scales being keeled only in their basal half,

of the former was apparently donated to the Philadelphia Academy and served as type of Cope's E. semicarinatus: the other three are still in the U. S. National Museum as No. 7354, but the identity of each specimen was not maintained, and it is now impossible to point out with certainty their individual origin. So much is certain, however, that the specimen now designated as No. 7354c is the type of Hallowell's L. fasciatus, his description being based on that one alone. I venture the guess that this is the second of the Perry expedition specimens and that the other two are Stimpson's specimens from "Japan."

There is indirect evidence that Hallowell was mistaken about these two specimens of *Lepidocephalus fasciatus* being from "Japan" as distinct from "Loo Choo." Altogether he recorded only the following land snakes as being collected by the Rodgers expedition (W. Stimpson):

From "Loo Choo:"

P. 492. Bothrops flavourulis, 1 specimen from Amakanma Island, and

P. 493. Eurypholis semicarinatus, 2 specimens from near Napa, Loo Choo, caught by Mr. Wright, Nov., 1855.

From "Japan:"

- P. 498. Leptophidium dorsale, 1 specumen, "taken on a hillside near Hakodadi, Island of Jesso, June, 1855, by W. Stimpson."
- P. 498 Lepidocephalus fasciatus, 2 specimens.
- P. 499. Amphiesma tigrinum, 2 specimens "caught at Niphon, Japan, May, 1855, by Mr. Stimpson."

Dr. W. Stimpson, in his manuscript catalogue of specimens brought home by the Rodgers Expedition, enumerates the following specimens:

From "Loo Choo":

No. Am. 2. Amakırrima, April, 1855.

y 200. Snakes taken near Napa, Loo Choo, Nov., 1854 (Wright).

y-199. Snake shot in a paddyfield, Loo Choo, Nov., 1854 (W. S.)

 γ -187. Snake caught at Loo Choo, under a stone in low land, Nov., 1854 (W. S.) From Japan

No. y 249 Snake taken on a hillside near Hakodadi, I. of Jeseo, Japan, June 1855 (W.S.).

y 275. Simoda Island of Niphon Japan, May, 1855 (Mr. Brooke).

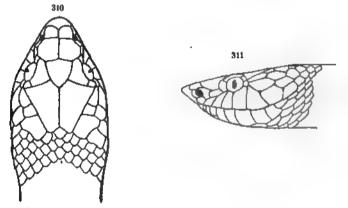
y 277 Simoda Island of Niphon, Japan, May, 1855 (W.S.).

It is plain that No. Am. 2 is Bothrops flavoviridis; No. γ 200 is Eurypholis semicarinatus; No. γ 249 is Leptophidium dorsale; and Nos. γ 275 and γ 277 are the two specimens of Amphiesma tigrinum. Thus all the specimens enumerated by Hallowell and Stimpson are accounted for except the latter's Nos. γ 199 and γ 187 from "Loo Choo" or Okinawa shima, and the former's two specimens of

^a The other snakes recorded are *Elaphis bilineatus*, collected by Doctor Morrow, and *Proterodon tessellatus*, without any record of locality or collector.

Lepidocephalus fasciatus. There can scarcely be the slightest doubt, therefore, that they are identical, and that Hallowell's locality, "Japan," for this species, is erroneous.

Description (figs. 310-311).—Adult male; U.S.N.M., No. 7354a; paratype of Lepidocephalus fasciatus; Okinawa shima; November, 1854?; W. Stimpson, collector? Rostral a little less than twice as broad as high, the portion visible from above equaling about two and a half times its distance from frontal and about one-half the interprefrontal suture; internasals small, less than half as large as the prefrontals which are broadly in contact with supraoculars; frontal broad and short, slightly longer than broad, its length less than interparietal suture and equaling its distance from rostral, the anterior outline nearly straight, the lateral outline curved to the posterior apex; supraoculars narrow, much narrower in front than behind; parietals long, nearly as long as frontal and prefrontal together;



Figs. 310-311 — Dinodon semicabinatum $1\frac{1}{4} \times$ nat size 310, for of head, 311, side of head. No. 7354c, U.S.N.M

nostril large, between two nasals of which the posterior is much the larger; loreal long and narrow, twice as long as high, upper and lower edges parallel; one small preocular widely separated from frontal; two postoculars; temporals 2+3; the upper temporal of the third row very large, bordering the posterior half of the parietal externally, 8 supralabials, third, fourth, and fifth entering eye, the upper portion of the third being greatly extended posteriorly for the purpose, sixth and seventh largest; five lower labials in contact with anterior chin-shields which are somewhat longer than the posterior; 17 rows of scales, the four outer rows on each side smooth, the other with a feeble though distinct keel on the basal half of each scale; 229 ventrals with a strongly marked lateral angle; anal entire; 100 pairs of subcaudals. Color (in alcohol) pale yellowish with 40 dark crossbars on the body and about twenty on the tail, these bars having solid blackish margins while the scales inside the bars have yellow

centers; alternating with these cross-bars there is a series of lateral blackish spots mostly on the four outer scale rows and more or less connected with an irregular series of single or double spots on the upturned ends of the ventrals; nape black with two yellowish spots on the outer posterior angle of the parietals and the adjacent scales; top of head blackish with ill-defined yellowish markings; sides of head yellowish, most of the shields, including the supralabials, narrowly edged with blackish; underside uniform pale yellowish, that of the tail with irregular blackish brown spots medially.

Dimensions

	mm.
Total length	880
Snort to vent .	. 690
Vent to tin of fail	. 190

The younger specimen, Sci. Coll. Mus., Tokyo, No. 10, is essentially like the adult—It grows to a considerable size, as a specimen from O-shima with defective tail measures 1,510 mm, in length,

Variation — This snake does not seem to be subject to great variation, as the only abnormalities in the specimens recorded are two posterior temporals on both sides in one, nine supralabials on one side in another specimen and only two supralabials, namely, fourth and fifth, touching the eye in a third specimen. The ventrals vary between 211 and 234, and the subcaudals between 92 and 105 in the perfect specimens on record. The lowest extreme of the latter is given by Boulenger as 65, but this figure is derived from Hallowell's account of the type of Lepidocephalus fasciatus in which, however, the tail is mutilated.

Habitat – Both the Perry Expedition and the Rodgers Expedition brought home specimens of this species, those from the latter being said to hail from "Japan" in contradistinction to the former as being from the Riu Kius, but as shown above this statement is undoubtedly erroneous. Later collectors, including Mr. Tashiro, have also obtained it in Okinawa shima, and in British Museum there is a specimen from "Oho shima" collected by Lieut. A. Carpenter, R. N., from which island Mr. Nakagawa also brought a specimen in 1891 to the Science College Museum—Recently other specimens from Okinawa shima and Amami-o-shima have been recorded by Dr. Wall.

In the National Museum, Ueno Park, Tokyo, there is a specimen (No. 23 of this species said to be from the province of Hiuga, southern Kiusiu. If the locality given is correct, it is the only record of the species in Japan proper, but the occurrence there needs confirmation.

						-				
Мизопт.	No.	Sex and age.	Locality.	When collected.	By whom col- lected or from whom received	Scala rows	Ventrals.	Anal.	Subcaudale. Temporale.	Supralabiale.
				1854°		_1				
					Rodgers Exped?				100;2 +3	
Do	73648	Female .	.do	do '	do	17	215	1	- 2+3	8
Do	7354c	do.ti	, do	1853.7	Perry Exped *	17	218	1	. 2+3	8
			O-shima		Nakagawa.	,	233			8 9
Tokyo.		Marc 1,			a - u a - u a - u	.,		,		
	10	Young.	Okinawa shima	1887	Tashiro.	17	229	- 1	105 2 + 2	8
Do	54	- 1	do		do ,			- 1		
Do	34		do		, do .			1		
Nat. Mus	23		Hiuga, Klusiu (*)	*		17		1		
Tokyo.										-
Brit. Mus	a	Male .	Amami-o-shima		Lieut A Car- penter	17	234	1	97	
Do	ь	. do	Okinawa shima,		Holat.	17	228	1	101	
Do	c	Young	do		do	17	211	- 1	93,	
Phila. Acad		(d)	" Loo Choo"		Porry Exped. (W Helne).	37	221	1	92 2+	8

List of specimens of Dinodon semicarinatum.

DINODON SEPTENTRIONALE a RUHSTRATIb (Fischer).

- 1868. *Ophites albofuscus Guenther, Ann. Mag. Nat. Hist. (4), I, 1868, p. 426 (Formosa; Brit. Mus. (not of Duméril and Bibron)
- 1886. Ophites rubstrati Fischer, Abb. Naturw Ver. Hamburg, IX, Pt. 1, no. 6, p. 16, pl. ii. fig. 6 (type-locality, south Formosa; types in Mus. Oldenburg; Rubstrat, collector).
- 1893. Dinodon septentrionalis Boulenger, Cat. Sn. Brit. Mus., I, p. 363 (part: Formosa).
- 1899. Dinodon septentrionalis var. ruhstrati Boulenger, Proc. Zool. Soc. London, 1899, p. 165 (Formosa).

Doctor Guenther, as quoted above, in a paper dealing with new additions to the British Museum snake collection, mentions Ophites albofuscus with the statement: "Occurs also in Formosa; feeds on lizards." In Boulenger's catalogue there is no indication of any specimen of this species from Formosa being in British Museum. I take it, therefore, that Guenther mistook Swinhoe's specimens from Formosa for this species, a supposition the more probable as he afterwards in describing Ophites septentrionalis referred it to the same genus. O. albofuscus is restricted to Sumatra and Borneo (see p. 357).

Description p. 368.
 Type of L fasciains, figs. 310-311.

c Total length 1,510 mm.; tail defective. d Cope, 1860, p. 253; type.

a Ophics septentrionalis Guenther, Proc. Zool. Soc. London, 1875, p. 233 (type-locality, unknown, but supposed to be "northern India," Boulenger giving "Himalayas or Khasi Hills (?);" Jerdon, collector).

From Septentrionalis, signifying northern.

^b For Mr. Ruhstrat, who collected the types in southern Formosa.

The collective species *Dinodon septentrionale* is recorded from the eastern Himalayas or Khasi Hills, in Assam, and the Karen Hills, in Burma, to castern China and Formosa.

The exact relation of the specimens from the various localities is not very well known, but there seem to be several color forms, of which the casternmost and the westernmost are the extremes, viz, the typical subspecies *D* septentrionale from Assam or Himalaya, and Burma, on the one side, and *D*, septentrionale rubstrati, from Formosa, on the other. Specimens from the Chinese coast province of Fokien, according to Boulenger, are "intermediate in the pattern of coloration" between these two forms. The status of the form which occurs in the mountains of Kiukiang is still uncertain on account of scantiness of the material.

It is unfortunate that the full scale formulas of the three Fokien specimens has not been published, as altogether the formulas of only seven specimens have been recorded, and the more so since the latter seem to indicate a possible difference in the number of subcaudals in one of the races—1 find, namely, that in the three Formosan specimens in which the tail was complete the subcaudals number, respectively, 103, 104, and 97, while in the three continental specimens on record they are stated to be 83, 87, and 88.

Under these circumstances it seems best to maintain, for the present at least, the subspecific distinctness of the Formosan specimens

A partial translation of Doctor Fischer's original description of the scutellation and coloration of the Formosan specimens is subjoined, as I have not seen any specimens of this form.

Description South Formosa, Mus Oldenburg; Ruhstrat, col-Rostral just reaching the upper side of the snout, internasals slightly broader than long, longer than the prefrontals; frontal pentagonal, as broad as long, shorter than the interparietal suture; nostril between two masals, of which the posterior is much higher than the anterior; loreal pentagonal, twice as long as high, its posterior angle reaching under the preocular; latter well developed. quadrangular, twice as high as long, resting on the third supralabial and part of the loreal, extending to the upper surface of the head, though not reaching the frontal; two postoculars, the lower resting on fifth and sixth supralabials; temporals 2 + 3, the two anterior in contact with both postoculars, eight supralabials, of which third, fourth, and fifth join the eye; ten infralabials, the first six in contact with the chin-shields; the posterior chin shields somewhat narrower and but slightly shorter than the anterior; between these and the ventrals two or three rows of elongated throat scales; scales in 17 rows, only the six or eight median rows b weakly keeled; ventrals

⁹ Proc. Zool. Soc. London, 1899, p. 165.

b Must be seven or nine " as the number of scale rows is uneven. L. S.

221 to 223, laterally with a distinct but not sharp angle; anal single; 103 pairs of subcaudals, followed by a horny tip. Head to the middle of the frontal deep black, thence to the third scale row on the nape gray in the old specimen, pure white in the quite young one; ground color above reddish gray; numerous (47 to the anus in the old, 36 in the young) deep brown, light-edged crossbands descending on the sides almost to the ventral surface, the spots as in O. orientalis, cut on the posterior two-thirds of the body by a light longitudinal line on the fourth scale row, so that the portions thus cut off form a separate row of spots; alternating with these the upturned portion of many ventrals have a small brown spot, thus forming another series of spots on each side; the tail above also has a series of dark brown transverse spots, which in the young specimen extend to the ventrals, forming (18) complete rings; the brown dorsal spots gradually diminish in width posteriorly, the first one on the nape extending over 17 scales, while those following become gradually shorter. until on the second third of the body the light interspaces exceed them in width (especially in the young specimen); underside of head and body yellowish white, the tail of the old specimen gravish brown. of the young divided by complete dark rings.

Dimensions. Young specimen: Total length, 250 mm.; tail, 60 mm. Habit t. The distribution of the species has been given above under the preliminary remarks.

The subspecies, D. ruhstrati, as here understood, is confined to the island of Formosa, where it has been collected by Mr. R. Swinhoe, and later by Mr. Ruhstraht, the specimens brought home by the former being in British Museum, while those by the latter are in the natural history museum in Oldenburg.

List of specimens of Diradon robstrate

Museum	10	Sex and	Lacality	When By whom col- col- lected lected	Scape fown	Vertrais	Yunl	× Jepudala
Oldenburg	a	Adulta	South Formosa	Rull strat	17	221		
Do	b	Youngo	da	le	17	223	1	103
Brit Mus	b	Permate 6	Formosa	R Swinbae	17	216	11	194
Dπ	ſ	do b	do	la la	17	224	ı	177
	a (*o	types, Fisc	мет р 16	b Tsentingger Car	l, q 1	6d		

DINODON ORIENTALE " Hilgendorf)

BHIROMADARA (Doctor LIIMA, In Letter)

1880 Ophites occurtalis Higgshoute Sitz Ber Ges Naturf Fr Berlin, 1880 p.
115, pl = , figs 1 5 (type-locality, Tokyo type Berlin Mus No. 9119,
Hilgendorf collector

1880. Ophites japonicus Ctenther Ann Mag Nat Hist (5, VI. Dec., 1880 p. 462
type-locality Nikko, Hondo types, in Brit Mus. Maries (ollector.,—
Musliff Verh Naturf Ges Basel, VIII, Pt. 2, 1887, p. 270 Japan)
Divodon japonicus Bottenger, Cat. Snakes Brit Mus. I., 1893, p. 363
(Nikko Hondo) Boettger, Kat Schl Mus. Senckenberg., 1898 p. 38
(Hondo) Wall Proc Zool Soc London 1903, p. 100 Kiusio) 1905,
II, p. 513 (Yamanashi, Hondo) Nikolski, Zap. Imp. Akad. Nauk, S.
Peterburg. 8 XVII. No. 1, 1905), p. 224 (Nagasaki)

Hilgendorf's Ophites orientalis was described in the Sitzungs-Bericht of the meeting held October 19, 1880, which was probably published very shortly after that date. Guenther's O. japonicus, on the other hand, appeared in the December number of the Annals and Magazine of the same year. There is, therefore, apparently a very brief priority in favor of Hilgendorf's description. It may be interesting to note that Hilgendorf as early as 1876 indicated this species, but refrained from naming it.^a

Description, Young: U.S.N.M. No. 34052; Mount Fuji: August. 1898; Owston collection. Rostral broader than high, the portion visible from above scarcely as long as suture between internasals; the latter small, less than half as long as prefrontals, the suture between the former only half as long as that between the latter: prefrontals broadly in contact with supraoculars and with eye; frontal as broad as long, and as long as its distance from rostral, shorter than interparietal suture; supraoculars small, less than half the size of frontal; parietals large, nearly twice as long as frontal; nostril large, round, between two subequal nasals; loreal narrow, twice as long as high, entering eye below prefrontal; no preocular; two postoculars; temporals, 2 + 3; a very large upper temporal of the third row bordering the posterior half of parietal externally; 8 supralabials, sixth largest, fourth and fifth entering eye; 5 lower labials in contact with anterior pair of chin-shields, which are somewhat larger than posterior; 17 rows of scales, all of which are smooth on the anterior half of the body, but on the posterior half the median 5 to 7 rows have a faint keel at the base of each scale; 207 ventrals, distinctly angulate laterally, anal divided; 74 pairs of subcaudals, Color (in alcohol) above dull ecru-drab with dark brown cross-bars, 38 on the body, 15 on the tail, these bars being broader than the intervening light ground color on the anterior part of the body, but becoming gradually narrower posteriorly so as to be narrower than the light interspaces; the latter are paler colored along the edges of the dark cross-bars; on the posterior half of the body the lower part of the bars are separated off by a narrow light line between fourth and fifth scale row; on the sides of the middle third of the body there is an

[&]quot;Mitth Dentsch Ges. Ost-Asiens, I heft 40, July, 1876, p. 30.

 $[^]b$ Hilgendorf says $^{-1}$ Oberseite in frischem Zustande, schmitzig braunroth, ziemlich hell."

alternating series of vertical brown spots between the lower end of the cross-bars; top of head uniform dark brown; lower part of supralabials and entire temporal region, including the posterior lateral portion of the parietals, whitish; underside whitish with a few dusky marblings on the middle and occasional dark spots on the sides of the ventrals of the posterior half; dorsal cross-bars nearly meeting on underside of tail.

Dimensions.

	mm.
Total length	290
Snout to vent	235
Vent to tip of tail	55

The adult specimens are essentially like the one described above, but this snake does not seem to reach any considerable size. Boulenger measures a total length of 660 mm. and the species probably does not grow much larger.

Variation.—Comparatively little variation is shown in the scutellation of this species, and then mostly in the temporals, the second row occasionally having only two scales. There seems also to be some variability in the number of supralabials in touch with the eye, inasmuch as both Hilgendorf and Boulenger state that in their specimens the third also enters into relation with it. In all those specimens in our museum, however, the third supralabial is excluded from the eye, the loreal being in broad contact with the fourth supralabial. Ventrals vary between 199 and 208; subcaudals between 68 and 75 pairs.

Habitat.—Apparently restricted to Japan proper. Hilgendorf in describing the species mentioned seven specimens from the neighborhood of Tokyo, mostly from the Botanical Garden, and for this reason he suspected that the species had been accidentally introduced. This suspicion seems to be unfounded in view of the many specimens which have been found in various localities both in Hondo and Kiu-The two specimens in the British Musum were collected by Mr. Maries at Nikko; Doctor Nordquist found a specimen at Murayama, and United States National Museum has a specimen each from Isobe near Yokohama and from "Mount Fuji;" a specimen (No. 5) from the province of Iga is in the Imperial Museum, Ueno Park, Tokyo. Finally Doctor Wall mentions one specimen from Yamanashi, Hondo, and one from Kiusiu. It was collected there as early as 1879 by Dr. O. Nordquist near Nagasaki, where another specimen, now in the St. Petersburg Museum, was collected by Doctor Slunin in 1888. the Nordquist specimens are in the Riksmuseum at Stockholm, where I was permitted to examine them in 1905, thanks to the kindness of the curator, Dr. Einar Loennberg.

Museum.	No	Sex and	Locality.	When collected.	By whom collected or from whom received	Seale rows	Ventrals	Ana	Subcaudals	Тепърогия	Suprafalvials
				1998.							
USNM	34052	Youngu	Mount Fujl	Aug	1 Owaton.	17	207	- 2	74	2+3	8
				1904.							
Do	34543	Raligr.	Isobe, near Yoko-	May 10	do	17	201	2		2+2	9
			hama								
Do	30/342	. do b.	Tokyo		Set. Coll , Tokyo	17	203	2'	73	2+2	8
Sct. Coll,	64	Female	do .			17	190	2	75	2+3	8
Tukyo				1979.							
Stockholm	418	do	Murayama, Hondo	Nos 27	Dr O Nordquist	17	201	2	72	2+3	8
110	419	Мије	Nagasaki, Kiustu	Dec.	do	17	203	2	74	2+2	- 8
				1874	-		200				
Berlin	9419	Younge	Trikyo .	May	Doctor Bilgen	17	or	} 2	74	2+2	8
					dorf		208	}			
Brit Mus.	Qi.	Female ¢	Nikko		(Maries .	37	303		65	2 + 3	8
Do	ь	do	do .		do	17	205	2	70	2 + 3	8

a Description, p. 373.

Genus CALAMARIAª Boie.

1827. Calamaria Boie, Férrusac, Bull Sci Nat. IX, p 236 (type, Coluber calamarius).

1834 Changulia (FRAY, III. Ind. Zool., II. (pl. 1 xxxvi), (type, C. olbiventer)

The range of the genus embraces the Malayan archipelago, extending into Burma, southern China, and the Philippine archipelago. One species is from the southern and middle group of the Riu Kiu archipelago, and one is here recorded from Formosa for the first time.

Of the Calamarias with four supralabials there is a small compact group containing C. brevis, from an unknown locality; C. pavimentata, from Java; C. siamensis from the Indo-China peninsula and southern China; C. berezowskii from the upper Yangtse Valley and Formosa; C. septentrionalis from the lower Yangtse and the coast of China; and C. pfefferi from the Riu Kiu Archipelago. Boulenger has united C. pavimentata and C. siamensis under the former name, but while I have no specimens for comparison, the figures and descriptions show such contradictions that I can not consider the question finally settled. A long narrow head is characteristic of C. brevis and C. pfefferi, which also agree in the lack of a yellow collar and light spots. They are probably nearly related. On the other hand C. siamensis, berezowskii, and septentrionalis are very closely alhed and I have some doubts whether they are properly separated and whether the specimens from

⁶ Sci Coll No 64a c Type, Hilgendorf, p. 116.

d Cotypes of O japonicus Boulenger, Cat. I, p 364.

^a Signifying like a reed, from καλαμος, a tube, a straw.

St. Petersb.

Dn.

Museum	No	Sex.	. Locality.	When collected.	By whom collected.	Scale rows.	Ventrals.	Anal.	Bubeaudale.	Oculare.	- Marine and Marine
Sel Coll.	12	Male =	Taipa, Formosa.	1897. Sept.	T Tada	а	100	1	33	1,1	4

1893...

1503

M Berezowski.

167

List of specimens of Calamaria berezowskii.

Description p. 376 Type. Guenther, p. 206. CALAMARIA PFEFFERI^a Stejneger.

Lun-ngan-fu, Bre-

chuen.

- 1901. Calamaria pfefferi Steineger, Proc. Biol. Soc. Washington, XIV, Dec. 12, 1901, p. 191 (type-locality, Miyakoshima, Sake shima group, Riu Kius; type, Science Coll. Mus. Tokyo, No. 14).
- 1903. Calamaria parimentata Wall, Proc. Zool. Soc. London, 1903, p. 101 (not of Duméril and Bibron).

Doctor Wall be expresses the opinion that my C. pfefferi is nothing but C. pavimentata [Boulenger, not Duméril and Bibron, siamensis Guenther], but nothing shows better than this case how dangerous it is to "lump" species without having seen the material upon which they are based or without having at least material from the type locality. As a matter of fact, it is not to the form mentioned by Doctor Wall, but to Boulenger's C. brevis that our Riu Kiu species is most nearly related. With the latter it shares the long and narrow head as well as the plain upper surface and spotted underside, and the chief differences appear to be the shorter parietals and the low number of ventrals in the latter. Unfortunately, the habitat of the unique type of C brevis is not known, and the exact relationship of these two forms must consequently remain unsettled until more material shall have been accumulated and direct comparisons between typical specimens instituted.

Description. -Halfgrown female; Science College Museum, Tokyo, No. 14. Miyakoshima, Riu Kiu archipelago; type (figs. 313-316). Rostral about as high as broad, the portion visible from above nearly as long as suture between prefrontals; no internasals; prefrontals smaller than frontal, in contact with first and second supralabials; frontal considerably longer than broad, the width equaling the distance from tip of snout but shorter than interparietal suture, about three and a half times as wide as supraoculars, six-sided, forming an

 $[\]sigma$ Named in honor of Dr. George Pfeffer, curator in the Natural History Museum, Hamburg.

^b Proc. Zool. Soc. London, 1903, p. 93, footnote

obtuse angle in front and an acute one behind, sutures with supraoculars longer than those with prefrontals; parietals in contact with fourth supralabial, longer than their distance from tip of snout; the suture between them twice as long as that between prefrontals, rather narrow, especially posteriorly, nostril small, in a small nasal between rostral, first supralabial and prefrontal; one preocular; one postocular; no temporals; a large single shield bordering posterior half of parietal behind fourth supralabial; four supralabials, fourth largest, three times as large as second which is somewhat larger than first and third, second and third entering eye; first pair of lower labials forming a suture behind mental; two pairs of subequal chin-shields in con-

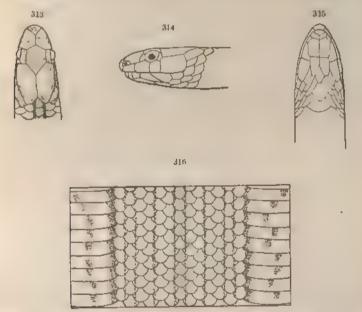


Fig. 3.3-Tip Calamaria presert 4 - Nat size 313 top of heap with color pattern 314, side of heap 3.5, underside of heap Fniarged, 3.6, color pattern abound middle of hody. No 14, Sci Cold T kyo

tact with each other; scales smooth, in 13 rows without apical pits; 160 ventrals; anal undivided; 15 pairs of subcaudals; tail ending in a very short spine. Color (in alcohol) above brownish gray with 9 parallel darker stripes commencing directly behind the parietals; of these stripes the median one covers the entire width of the vertebral scale row, while the others only occupy the lines between the scale rows, viz. on each side, one between the ventrals and first scale row, and one between first and second and one between second and third rows, and finally one between fourth and fifth rows; head slightly paler than the body with a few rather irregular and ill defined darker markings; an ill-defined dark band from nostril through eye and over upper portion of fourth supralabial; labials below this band and entire

underside pale yellowish, each ventral usually marked with two welldefined, but irregularly placed, dark brown spots which, however, show a tendency to an arrangement in two longitudinal rows; under the tail a broad well-defined median band of similar color occupying the suture between the subcaudals and also extending down the middle of the anal; no nuchal collar, nor any yellowish spots at base of tail.

Dimensions,	
	198 705 .
Total length	162
Snout to vent	152
Vent to tip of tail	10

The male is distinguished by a longer tail with a larger number of subcaudals.

Variation.—A specimen from Okinawa shima in the Hamburg Museum (No. 1567) collected by Doctor Warburg is very similar in scale formula, viz, sc. 13; v. 158; a. 1; c. 15; oc. 1-1; l. 4; 1st pair of lower labials in contact behind mental; second pair of chin-shields in contact; frontal four times as broad as supraocular; parietals longer than frontal. Coloration is also essentially like the one described above, there being no collar, and no yellow spots at base of or at end of tail, but there are two dorsal stripes more; the median dark stripe is two scales wide and separated by an interspace of equal width on both sides from the other stripes, of which there are five on each side; belly irregularly spotted with dark brown; a broad dark stripe along middle of underside of tail.

Science College Museum No. 13, from Okinawa shima is also similar in coloration, lacking collar and spots on tail, but has 26 pairs of subcaudals, being a male.

Habitat.—Thus far this Calamaria is only known from the Riu Kiu Islands, where it has been collected both in the southern group, viz, on Miyakoshima, and in the middle group, on Okinawa shima, a specimen from each of these localities being in the Tokyo Museum. A third specimen, from the latter island where Doctor Warburg collected it, is in the Hamburg Museum.

List of specimens of Calamaria pfeffers.

	-			· ·			
Museum	Nο	Sex,	Locality	When 1 col- lected.	Br whom collects I	Scale rows Ventrals	Subcaudata. Oculara Supratablata.
Sci. Coll.	1.4	Fomolog	Miyakoshima, Ru			13, 130 3	35 1 1 A
Tokyo.	14		Kiu.				
Do	13	Male	Okmawa shima. Riu Kiu.		3		20
Hamburg.	1567	(4)	do.,	1	Doctor War earg	15, 158 - 1	15 1-1 4
_	a	Type, des	cription p. 378, figs.	313-316.	b	P. 380.	_

Subfamily BOIGIN.E.

There does not seem to be any convincing proof that these snakes, although provided with grooved fangs at the posterior end of the maxilla, are particularly close allies of the other opisthoglyph snakes, such as the *Homalopsina*. Nor do the *Langahina* which, like the latter and the Natricine snakes, have the hypopophyses present throughout the vertebral column, and which form a group chiefly confined to Madagascar, appear to belong here.

Like the coronelline subfamily the present one contains forms of very varied habits, arboreal, terrestrial, and subterranean, diurnal

and nocturnal, etc.

Their distribution is chiefly tropical and southern both in the Old and the New World. The subfamily is therefore represented within our limits by only two genera, each with a single species, both recorded from Formosa.

They may be distinguished as follows:

a² Third or third and fourth maxilary teeth much enlarged mostril in an unitwided masal scales without pits—sea es in 17 or rarely 19 rows, less than 180 ventrals; anal entire. Psaumodynastis pidierulentus, p. 383.

Genus BOIGA # Fitzinger.

- 1826 Boiga Fitzinger Neue Classif Rept., pp. 29, 31 (type, Coluber arregularis).
- 1843 Dipsadon or plats Puzzinger Syst Rept , p. 27 (type, Dipsas trajonala)
- 1843 Macrocephales Fitzingen Syst Rept p 27 (type, Depsas drapaen)
- 1843. Georgeotypsus Ferzinger, Syst. Rept., p. 27. type, Depsus occupilarus
- 1843 Endepsas l'itzinger Syst Rept, p 27 type, Depsas cynodon
- 1843 Cephalophis Figureau Syst Rept p 27 (type, Diprochembrophila)
- 1853 Opeticular Dengant, Prode Class Ophid, p. 98 Type, O cymodon
- 1853 Triglyphodon D: MERII, Prodr Class Ophid p 111 type, T irreg dure
- 1857 Torreadry as Hallowell, Proc Phila Acad, 1857 p. 60 type, T. blandingrif
- 1877 Pappophis MacCan Proc Laun Soc. New S. Wales II, p 39 type, P. laticeps).
- 1895 Liophallus Cope, Proc. Phila Acad. 1894, p. 427 type, Inpan fusca.

Fitzinger's Boiga, of 1826, clearly takes precedence over his Dipsadomorphus of 1843, as shown by me.b

BOIGA KRÆPELINIC Stejneger

1902. Bonga kra pelem Steinhoff Proc. Biol. Soc. Washington, XV, p. 16 (type-locality Kelanz Formosa typen Naturh Hist Mas. Hamburg No. 1565. Doctor Warlanz, collector. — In pseudomorphus kraepelini Walt, Proc. Zool. Soc. London, 1903, p. 94. Formosa.

a "La Boiga — is a name given by the early French ophiologists to some brilliantly colored tropical snake. The name is probably of barbaric erigin.— Agassiz suggests its connection with Boa, but apparently with ne good reason.

b Proc. Riol. Soc., Washington, XV, 1902. p. 16.

^{&#}x27; Dedicated to Prof. K. Krapelin, director of the Natural History Museum in Hamburg.

Description of type specimen. - Naturh, Mus. Hamburg, No. 1565; Kelung, Formosa: Doctor Warburg, collector. About 11 solid maxillary teeth, subequal, slightly separated from grooved fangs, which are not much enlarged; head very distinct from neck; eve large, equaling its distance from anterior border of nostril, with vertically clliptical pupil, rostral wider than high, barely visible from above; internasals much broader than long, much shorter than prefrontals. frontal as long as broad, as long as its distance from rostral and as the interparietal suture; nasals large, posterior concave; loreal higher than long; 2 preoculars, the upper one reaching the upper surface of the head, but separated widely from frontal: 2 postoculars: temporals 4 + 5, scale-like, irregular: 9 supralabials, of which the third, fourth, and fifth enter the eye; 5 (on one side 6) lower labials in contact with anterior chin shields, which are much larger than the posterior pair; body compressed, about twice as high as wide; scales in 21 oblique rows, smooth, with apical pits. the vertebral row scarcely enlarged, the scales pointed behind, ventrals, 245, flat underneath, obtusely angulate laterally; anal double; subcaudals, 142 pairs. Color brownish gray, with about 57 darker cross-bars composed of black-edged scales from neck to anus, these cross-bars extending on the sides to about 4 scale rows from the ventrals; only faint indications of alternating lateral spots; top of head uniform brown; underside pale with a median area more gray ish and laterally bordered by an irregular dusky line following the ventral angle.

Variation.—The color description of specimen No. 1569, Hamburg Mus., which was also collected by Doctor Warburg near South Cape. Formosa, is as follows: Ground color paler and more gravish than the type (No. 1565), with better defined cross bands, which alternate with a row of lateral spots approximately covering the third, fourth, and fifth rows from the ventrals; the ventral median area darker and better defined; head with a median dark line on internasal and prefrontal sutures and middle of frontal, reappearing on the anterior part of upper neck as a median elliptical, brown spot; a similar brownish band from posterior half of supraoculars posteriorly to side of neck, where it joins another originating on the upper part of the rostral and running obliquely through nostril and eye over posterior supralabials to side of neck; between these lines a pale gray band with whitish edges: supralabials also pale, more or less marked with dusky and with a dusky spot on the suture below the center of the eye.

The specimen in the Hongkong City Hall Museum examined by Doctor Wall had six temporals on one side and ten labials on one side; fiv lower labials in contact with anterior chin-shields on both sides.

Remarks. -Kræpelin's Boiga differs from most of the other species of the genus in having a double anal and a scarcely enlarged vertebral scale series; also in the very short posterior chin-shields, and especially in the numerous small temporals.

Habitat.—This species is only known from Formosa, where two specimens were collected by Doctor Warburg, one at Kelung, in the northern part, the other near South Cape. A third specimen from Formosa is in the Hongkong Museum, as reported by Doctor Wall.

List of specimens of Boiga kræpelini.

Museum	No	Sex and age	Locality.	When col- lected	By whom col- lected	Scale rows.	Anal Subtandals, Temporula Supralahals
Hamburg a	1565	٠	Kelung, Formosa. Near South Cape,		Dr O Warburg	21 245 21 232	2 1424+5 9 2 1435+4 9-10
Hongkong <			Formosa	,		21 244	2 140 . 9-10
a	Туре,	descri	iption, p. 382.	(6 P. 382.	e Wal	l, p. 94.

Genus PSAMMODYNASTESª Guenther.

- 1858. Psammodynastes Guenther. Cat. Colubr. Su. Brit. Mus., p. 140 (type, P. pulverulentus.
- 1904. Thamnodynastes WERNER, Abh. Bayer, Akad. Wiss, (Muenchen), II Klasee, XXII, Pt. 2, p. 372 (lapsus; not of Wagler, 1830).
- 1905 Anisodon Rosen, Ann Mag Nat Hist (7), XV, Feb., 1905, p. 176 (type, A. blluborgi) (not of Lartet, 1849).
- 1905. Anisodonies Rosén, Ann. Mag. Nat. Hist. (7), XVI, Aug., 1905. p. 128 (substitute).

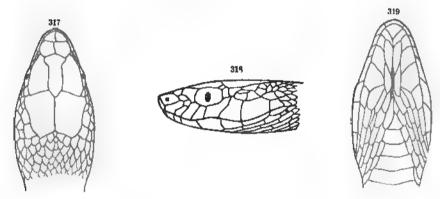
PSAMMODYNASTES PULVERULENTUS b (Boie).

- 1827. Psammophis pulverulenta Boie, Isis, 1827, p. 547 (type-locality, Java).—
 Schlegel, Phys. Serp. II, (1837), p. 211, pl. viii, figs 10-11 (Java).
 Psammodynastes pulverulentus Guenther, Cat. Colubr. Sn. Brit. Mus., 1858, pp. 140, 251 (Philippines, Sumatra, India) Boi lenger, Cat. Sn. Brit Mus., 1II (1896), p. 172 (Eastern Himalayas, etc.; Formosa).
- 1839, Dipsas ferruginea Canton, Proc. Zool. Soc. London, 1839, p. 53 (type-locality, Assam, type" in Brit. Mus.; Cantor, collector.
- 1867 Lycodon bairda Steinhachner Novara Exped., Zool., I, Rept., p 90 (type-locality, Philippines; types in Vienna Mus.).
- 1905. Ansodon httljeborg: Rosen, Ann. Mag Nat Hist. (7). XV, p. 176, pl. xt. tig. 3 (type-locality, Tjibodas, Java. types in Lund Mus.; Hj. Moeller, collector).

Description (figs. 317-319). -Adult female: Brit. Mus. No. 94. 1. 25. 9.; near Taiwan fu, Formosa; Holst, collector. Rostral higher than wide, visible from above; internasals small, only one-third the size of the prefrontals, nearly triangular; prefrontals very large, broadly in contact with preocular and loreal; frontals.

From ψάμμος, sand; δυνάστης, lord, ruler.

small, narrow, urceolate, the posterior outline rounded, the lateral sutures greatly concave; supraoculars excessively large, much larger than frontal, very broadly in contact with prefrontals; parietals large, the suture between them longer than the frontal; nostril a round hole in the middle of a single nasal; canthus rostralis sharp, overhanging the very concave loreal region; a small lozenge-shaped loreal; a single, large, concave preocular; three postoculars; temporals 2+(1 small)+3, the lower anterior on left side coalesced with supralabial; mouth very deeply cleft, with 8 supralabials, first long, in contact with loreal, 4, 5, and 6 in contact with eye; 8 lower labials, 3 in contact with first pair of chin-shields, of which there are three pairs; scales smooth, without pits, in 17 rows; ventrals 175; anal single; subcaudals 60. Color (in alcohol) brownish gray densely



Figs 317 319. -Psammodynastes pulverulentus. 2 × nat size. 317, top of head; 318, side of head, 319, underside of head. No. 34707, U.S.N.M.

spotted with dusky and pale ochraceous, forming a very obscure pattern; a dark narrow band from tip of snout to posterior end of frontal, followed by a V-shaped mark, the opening resting on the upper edge of the preoculars, the apex on the posterior end of the interparietal suture; a similar band, from upper postocular along outer edge of parietal; all the bands on the head composed of narrower dusky lines with a pale line between them; from apex of parietal V a solid dark line along the median line of the upper neck; an obscure dusky transocular band; underside brownish gray with two narrow dusky lines, one on each side of the median line; the grayish ground color is produced by innumerable dusky specks powdered all over the surface.

Dimensions.	
	mm
Total length	J82
Snout to vent	313
Vent to tip of tail	69

Variation. The lateral head-shields are subject to considerable variation. Thus there is often a second loreal underneath the ordinary one; the temporals are more or less irregular in many instances; the number of preoculars is sometimes two, while the postoculars vary between two and four. In a large series of specimens from the whole range of the species the minima and maxima of the ventrals have been found to be 146 and 175, the latter in the Formosa specimen described above, and of the subcaudals respectively 44 and 66.

The coloration is very variable, especially the ground color, which varies from nearly uniform raw umber to nearly blackish, with intermediate shades spotted with darker and paler in great profusion.

Habitat. Widely distributed from the eastern Himalayas to the Malay peninsula and archipelago, Indo-China, Philippine Islands, and Formosa.

The only record of its occurrence in the latter island is the female specimen in the British Museum, collected by Mr. Holst at Taiwan fu. and described above. I owe the opportunity to make this description to the kindness of Doctor Boalenger.

As yet Psammodynastes pulverulentus has not been recorded from the mainland of China and would thus appear to be an exception to the rule that the Formosan snakes have reached that island from China. On the other hand, its wide distribution in the Philippine Archipelago might tempt one to conclude that this species had arrived in Formosa from the south. With our present defective knowledge of the herpetology of China, such a conclusion would be too hasty, how-It is moreover a significant fact that this snake is at home in the eastern Hunalayas, and in the mountains of Assani and Burma, where so many other Formosan species, also occurring in China, have their nearest relatives and probable origin. There is every reason to believe that P. pulverulentus may yet be discovered in the mountains of southern and western China

List of specimens of Psammodynastis put erobotus

Макил	No.	Nr X	Piate 2011	Whore	the whom feeted	er I-	Stark Folks	Almi		strate this	I de la la de	Supringing	Lonal
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Do.	20,220	- 6	1r		de		17.1	16.2,	1	274 a	. + 1	5	J
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		Descrip	on je sv			0 F. K.	()	319,					

36180 No 58 07

Family ELAPIDÆ.

This family contains all the so-called "proteroglyph" snakes, or snakes with a permanently erect grooved poison fang in the anterior portion of the horizontal maxillary bone.

The members of the family are divided into two subfamilies, one containing the terrestrial species which have retained the general physiognomy of the majority of snakes, the other embracing forms which have become strongly modified for marine life, as follows:

As stated above, the general physiognomy of these snakes is that of the great majority of snakes, the Natricidæ, and the resemblance of some of the species in each family is so complete as to have deceived experts on a superficial examination. The generally small eye with vertical pupil, frequent absence of a loreal, and even width of head with body will serve to characterize many of the Elapines, but the presence of the poison fang is the only reliable criterion.

It is the more to be regretted that these snakes can not be readily and at a glance distinguished from the numerous harmless species, as they are the deadliest and often the most dangerous of all snakes. Thus the Indian cobra, found in Formosa, and the so-called hamadryad belong to this subfamily. The "krait," which grows to be over 4 feet, and which is represented by a separate form in Formosa (Bungarus multicinctus) is also very destructive of life where it is common. On the other hand, the smaller species, although their poison in proportion is equally deadly, are not very dangerous to man, partly because of the smallness of their mouths, partly, it seems, because of the supposed gentleness of some of them.

The Elapine snakes are truly tropical in their distribution. Only one genus, *Elaps*, occurs in America, while on the other hand the majority of the Australian snakes belong to this family.

Only four species, belonging to four genera, come within our limits, viz, three in Formosa and one in the Riu Kius, although it would not be surprising if additional species were discovered in the former island.

They may be distinguished as follows:

KEY TO THE FORMOSAN AND RIU KIUAN GENERA.

- a^{i} Median dorsal scale row not enlarged; subcaudals all, or mostly, in pairs.
 - b^{i} Neck not dilatable, not surrounded by more scale rows than middle of body; internasal not bordering the nostril.
 - c^1 One to three small teeth on maxillary behind fangs...... Hemibungarus, p. 387.

Genus HEMIBUNGARUS" Peters

1843 Brachyrhynchus Fitzinger, Syst Rept., p. 28 type, Elaps calligaster) cnot of Laporte, 1833.

1862. Hendlungarus Peters, Mon. Ber. Berlin, Akad. Wiss., 1862, p. 637 (type, Elaps call.gaster).

The only difference between the genera Hemibungarus and Calliophis appears to be the presence of several (1-3) small solid teeth on the maxillary bone behind the grooved fang in the former, and it is questionable whether these so-called genera really represent genetic groups. The two species occurring within our limits, namely, Calliophis macchellandii in Formosa and Hemibungarus japonicus in the Riu Kiu Islands seem to be so closely related to each other that the latter appears less nearly allied to any of the other species of Hemibungarus. The only difference, besides that of dentition, consists in the greater length of the parietals in H. japonicus and in a slightly different pattern of coloration. Thus far no Hemibungarus has been recorded from Formosa, but this island is as yet so imperfectly known that no conclusion can be based on this fact.

The relationship of these snakes (through Calliophis) is undoubtedly Himalayo-Chinese, but beyond this statement it would be hazardous

to generalize for the present.

The two forms described in the following pages under the names of *H. japonicus* and *H. boettgeri* are evidently very closely allied in spite of their very different coloration. The scutellation is almost identical, though it must be pointed out that in the former (9 specimens) the number of ventrals averages higher, namely, 208.5 (maximum 216, minimum 196), the corresponding figures for the latter (11 specimens) being 193-5 (204 and 183). While the scale formulas thus show some overlapping, the difference in coloration is so striking and apparently so constant, without any intermediary specimens, that I do not feel compelled to use trinominals for these forms, especially in view of their geographical isolation, the former being confined to the O-shima subgroup, the latter to the Okinawa subgroup of the Riu Kiu Archipelago.

They may be distinguished as follows:

HEMIBUNGARUS JAPONICUS 6 Guenther 1.

HAI according to Dr Inma

a From $\dot{\eta}\mu a$, half , and Bungaras , a nearly related genus of snakes, b Signifying Japanese.

Description .-- Young: U.S.N.M. No. 31817; Amami-o-shima, Riu Kiu Archipelago; Dr. H. M. Smith collection. Rostral broader than high, easily visible from above; internasals broader than long, the suture between them scarcely more than one-half that between the prefrontals which are broadly in contact with supraoculars; frontal longer than its distance from tip of snout and than interparietal suture, much broader than supraoculars; parietals very long, longer than frontal; nostril large, round, at the posterior margin of the anterior nostril, which is larger than the posterior and in contact with second supralabial; no loreal; a single preocular situated above the center of the eye in contact with posterior nasal; eye rather large, the diameter greater than its distance from edge of lip; two postoculars; temporals 1+1, second one very large; a large shield bordering the outer posterior half of parietal; 7 supralabials, sixth and seventh largest, third rather high, third and fourth entering eye; four lower labials in contact with anterior chin-shields which are as long as the posterior, fourth lower labial very large; 13 rows of smooth scales without apical pits; 196 ventrals; anal divided; 31 pairs of subcaudals. alcohol) pale cream-color (in life said to be red) with a narrow darkbrown median line, one scale wide, from frontal to tip of tail; 16 darkbrown rings around the body and tail, about 3 scales broad on back and two ventrals broad below, the intervals between them about three to four times as wide; top of head dark brown except the median portion of each parietal, the brown color on the sides of the head extending some distance past the last supralabial; on the underside a large, roundish blotch of dark brown extending over four ventrals between the rings.

Dimensions.

•	mm.
Totai length	221
Snout to vent	200
Vent to tip of tail	21

Judging from the adult female in British Museum, the full-grown specimens do not differ essentially from the young described above.

Variation. --The scutchation seems to be very constant, though the ventrals range between 196 and 216 in the nine specimens recorded. The subcaudals on the other hand only vary between 28 and 31 pairs.

The coloration is also rather constant, except that some specimens, for instance the type and the young specimen in British Museum, collected by M. Ferrié, have an additional dark-brown stripe along each side of the body. Its presence is not a sign of youth as shown by the specimen described above. The number of rings around the body varies slightly; thus in the specimen in the Imperial Museum in Ueno Park, Tokyo, there are 12 rings on the body, one at the vent and one on tail. In this specimen the dark bands on the back are plainly edged with whitish.

Since the above was written Doctor Wall has reported upon four specimens from Amami-o-shima, obtained by Mr. Owston's collectors. Of these two agreed in having three longitudinal dorsal black lines narrower than the white intervals. One of these had indications of another line in the flanks on each side. One had 12 and the other 14 black annuli. The ventrals and subcaudals were 208 + 29 and 198 + 28. Two others were pale pink with a single, narrow, vertebral black line. One of these had 15 and the other 13 black annuli, and the ventrals and subcaudals were 215 + 28 and 214 + 30.

Habitat. -This form appears to be restricted to the O-shima subgroup of the Riu Kiu Archipelago, inasmuch as all the specimens supplied with exact data have been taken in "Oo-shima," or as we prefer to call it, Amami-o-shima, in order to avoid confusion with the many other O-shimas.

Whitely's specimen, upon which Guenther founded the species, was said to have come from Nagasaki. We know now that all his specimens credited to that locality came from other places, the present one almost certainly from Amanu-o-shima.

List of specimens of Hemibungarus japonacus.

Museum	No.	Sex and age	Locality	When col- acted	By whom cel- acted	Sean rous	Fe Trais	tuni	Surgandals	Canlars Temporas	Supralablas
Brit Mus	a	Young of	" Vagasak "ler-		Whitely	1.5	205	2	29		7
			ror].								
Dn	d	do.a .	Amana o-shinii		Ferrié	13	211	2	2%		
110		Males	do		do	1.6	216	2	25		
Imper l'o-	24	Young	do			11	214	2	2	1,2,+1	7
kyn											
U.S.N.M.	31517	do #	do		11 M Sooth	13	J*#	2	31	12.+1	7
	# Т3-ре				F-1	Di se i	npt o	a, p	3×8,		-

HEMIBUNGARUS BOETTGERI 6 , Fritze .

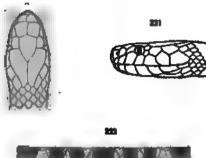
HAI , according to Dr Ijime .

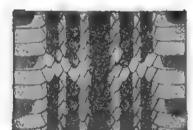
1892 Callophis japonicus Bollesker, Ann. Mag. Nat. Hist. (6), X. Oct. 1892, p. 302 Okinawa) not of Guenther). Boetvork Offenbach Ver Naturk. 33-36 Ber., 1895. p. 115. Okinawa). Hemioingarus, aponicus Bollesker, Cat. Snakes. Brit. Mus., H.I. 1890., p. 395., part. Okinawa). Boetvoer, Kat. Schl. Mus., Senckenberg., 1898. p. 123. Okinawa). Wale, Proc. Zool. Soc. London, 1905. H. p. 545. part. Okinawa).

1894 Callophis bottgeri Fierzy Zool Jahrb Syst VII p 861 author's separate p 12 (type-locality Tokachimara, Okinawashima type in Mus Senckenberg, Fritze (oliector) - Boetregen, Offenbach Ver Naturk 33/36 Ber, 1895 p 145 (Okinawa)

a Boulenger Cat. Sn. Brit. Mus., III, p. 395, foot note has already intumated that this specimen may have come from Riu Kiu.

b For Dr. Oscar Boettger, the distinguished herpetologist and malacologist of Museum Senekenbergianum, in Frankfurt am Main. Description.—Adult female; Fifth Higher Middle School collection, Kumamoto, No. B 25; Okinawa shima, Riu Kiu archipelago; 1891 (figs. 320-322). Rostral broader than high; frontal longer than its





Figs. 220-222.—Hemistyngarus softtgeri. 21 x hat. 2522. 250, for of head; 251, 2102 of head. Enlarged, 222, color pattern abound middle of bodt. No. B25, High School, Kumamoto.

distance from end of snout: parietals very long, as long as frontal and prefrontals together, and more than twice the distance from frontal to rostral; one preocular: two postoculars; temporals 1+1: 7 supralabials, third and fourth entering eye; 4 lower labials in contact with anterior chin-shields: 13 scale rows; ventrals 193; anal divided; subcaudals 29 pairs. Color (in alcohol) above iridescent blackish blue with four longitudinal light bands, the two median bands being apparently reddish, the two outer ones white. the former commencing on inner anterior corner of parietals and continuing to end of tail, the latter beginning on sides of neck and ending on sides in front of anus:

across this longitudinal pattern there is a transverse one consisting of about fourteen (of which one on the tail) irregular cross bands of bluish black, edged with white, more or less interrupted by the longitudinal stripes so as to form two superimposed ocelli; these black cross bands are carried across the belly on a single ventral; underside whitish with numerous large and irregular blackish blue blotches; labials of both jaws mottled light and blackish.

Dimensions.

	用性.
Total length	518
Snout to vent	
Vent to tip of tail	44

Variation.—With the exception of one specimen having 8 supralabials on one side, the head-shields show no noteworthy variation. In the specimens recorded the ventrals range between 183 and 204, the subcaudals between 27 and 30 only.

The coloration is also very constant. The only variation is a slight one in the number of the cross bands. Thus Science College Museum No. 3 has only 8 complete bands on body, while No. 25 in the Imperial Museum, Tokyo, has 10, both having one at the vent and one on tail.

Doctor Wall, since the above was written, has reported upon six specimens obtained in Okinawa by Owston's collectors, and states

that they were all alike in having five longitudinal black dorsal lines broader than the pink intervals. There were 9-12 narrow black annuli around the body and 1-2 \cdot 2 usually) on the tail. The ventrals and subcaudals are 204 + 28, 183 + 28, 194 + 30, 202 + t, 197 + 27, 129 (192 \cdot 6 \cdot 1 + 29).

Habitat This richly and uniquely colored form seems to be confined to the middle group of the Riu Kin archipelago, inasmuch as all the specimens of which we have detailed record are from Okmawa shima or "Great Loo Choo." Doctor Fritze collected the type on the west side of that island

List of special ens of Hemibiangueous boottyes.

Мизент	No	Sex acd age	Locality	Whe i col-	By whom co. et tea	State rows	1 intrais	Anal	Subcardula	Oculars	lempora a	Suprilifords,
Serukenberg Imper Tokyo Selical To		Adult e.	Okonswa shitus * kta Khi Okinawa shitua	.801 Aug 5	The let Ettle	11	084 200 192	2 2 2	20 28 30	1,2		7 1 7 8
kyo Kuma note School Brit Mas.	1V 25 9 9 3 14	kemale* Male	dc .	180)	P. Ifa at		193	2	29 25	1,2	1+1	7

Genus CALLIOPHIS / Grav

b Description p. 390, figs. (2) 322.

1834 Calhophis Gray Indian Zool II C bg Type C generics

1859 Callophia Geestaten Proc Zool Soc London (859 p. 8) emendation).

With regard to the genetic relationship of the snake's at present embraced in this genus it is sufficient to refer to the remarks under Hemibungarus (p. 387).

Calliophes univergatus occupies the eastern Himalayas, being represented further east, in Burma and South China, by C macchellandri. Two species inhabit the mountains in southern India, one the eastern Indian pennisula, from Burma to Cochin China, while one occupies the Malay pennisula and Sumatra

CALLIOPHIS MACCLELLANDII h Reinhardti.

1844 Elaps mardellandir Retnormot Calcuty John Nat Host IV p. 532; type for dity. Assume type in Mus. (openhagon — Callophus mardellandir Guenther Rept. Brit. In the p. 312 part. view.). Assum. Boxtention. Faunt. Brit. India. Rept. 890; p. 85; part. Assum. Burma.

" From Killlog Lenuty, John, snake.

6 Name 1 is benor of Dr. 5 des McCb Hand, then editor of the Cabutta Journal of Natural History, who presented the type to the Rese Misson in to published McCleBand is the author of a large namber of papers on Italian paleontology and with yology.

Southern China); Cat. Sn. Brit. Mus., III, 1896, p. 399 (part: forma typica, Assam; Pegu; Formosa; South China); Proc. Zool. Soc. London, 1899, p. 166 (Kuatun, Fokien, China).

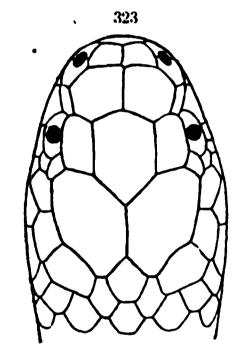
1854. Elaps personatus Blyth, Journ. Assiat. Soc. Bengal, XXIII, no. 3, p. 298 (type-locality, Assam).

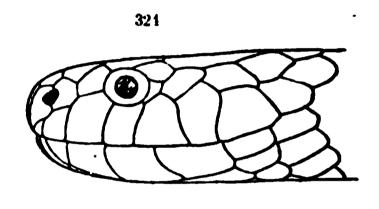
1861. Elaps macclellandi Reinhardt, Vid. Meddel. Naturh., For. Kjoebenhavn, 1860, p. 247 (part: Assam).

1864. Callophis annularis Guenther, Rept. Brit. India, p. 350, pl. xxiv, fig. 1 (type-locality, "India").a

Calliophis univirgatus,^b which is said to differ only in coloration, having a narrow black line down the middle of the back and no regular dorsal crossbars, is the western representative of the present species. It inhabits Sikkim and Nepal, apparently to the exclusion of typical C. macclellandii.

Description (figs. 323-324).—Adult male; British Museum; Formosa; R. Swinhoe, collector. Rostral barely visible from above;





Figs. 323-324. - Calliophis macclellandii. (From Boulenger, Fauna Brit. India, Rept., p. 383.)
323, top of head: 324, side of head.

internasals nearly entering nostrils; nostril in posterior edge of a large nasal, followed by a somewhat smaller postnasal; prefrontals large, broadly in contact with supraoculars; frontal about as long as its distance from tip of snout, slightly shorter than parietals; one large preocular in contact with postnasal, prefrontal, supraocular, and third supralabial; two postoculars; temporals 1+1; 7 supralabials, third and fourth entering eye, first small, third large, as large

^a In Boulenger's catalogue (III, p. 399) it is stated that the type in British Museum is from South China and presented by Mr. J. C. Bowring.

b 1858. Elaps univirgatus Guenther. Cat. Col. Sn. Brit. Mus., p. 231 (type-locality. Nepal; types in British Museum; Hodgson, collector).—Callophis univirgata Guenther, Proc. Zool. Soc. London, 1859 (p. 83, pl. xvn Nepal).

^{1861.} Elaps macclellandi REINHARDT, Vid. Meddel. Naturh. For. Kjoebenhavn, 1860, p. 247 (part. Darjeeling).

^{1861.} Callophis macchellandii Guenther. Proc. Zool. Soc. London, 1861, p. 219 (Nepal).

^{1896.} Collophis macclellandii var. univirgatur BOULENGER, Cat. Sn. Brit. Mus., III, p. 399 (Nepal; Darjeeling).

as sixth; 6 lower labials, four in contact with anterior chin-shields, fourth very large; posterior chin-shields about as large as unterior; 13 rows of smooth scales; 240 ventrals"; anal divided; 34 pairs of subcaudals.^a Color (in alcohol) above dull reddish gray, with 31 yellow-edged black rings on the body and 4 on the tail, the bands being one scale wide on the back and two ventrals wide on the underside; halfway between the rings on the back two black spots about 5 scales apart to within 4 rings from the vent, and on the underside a single rounded large black blotch on the median line; a black collar about three scales wide just back of temporals and including the extreme posterior angle of the parietals; another black band from edge of lip through eye and involving anterior third of frontal and the prefrontals; snout in front of this band, as well as the rest of the head between the two black bands yellow.

Dinansams					
		1078.			
Total length		400			
Snout to vent		363			
Vent to tip of tail		37			

Variation.—The only feature worthy of notice is the great range in the number of ventrals, as shown by the Indian and Chinese specimens in British Museum, the extremes being 182 and 240. It should be noted, however, that the latter figure is that of the only specimen thus far recorded from Formosa, and that there is a wide gap between it and the other specimens in this respect. It is not beyond the bounds of probability that the Formosan specimen may represent a separate form characterized by a greater number of ventrals.

Habitat.—Extending from Assam and Burma in the west to southern China and Formosa in the east. It is recorded from the mountains north of Kiukiang, and also from high altitudes (3,000 to 4,000 feet) in the province of Fokien

A single specimen collected by Swinhoe and now in the British Museum is known from Formosa.

List of specimens of Callraphia macelellands.

	Brit Mus. No.	Sex and age.	Locality.	When col- lected.	By whom conveted	Scale rows.	Ventrals	Anal	Subcaddais
	d	Male o	Formosa		R Swir hoe	.1	240	2	-34
	€	Half grown "	K ukiang Mountains China		A P. Pritt	-3	215	2	21
•	e	Male h	Southern (bira .		1 C Bowring		-12	2	-52
		do. <	Austun, Fosten		I D La Tombe	13	The	2	46

a Description p. 302. b Boulenger Cat III p. 800 / Rear up r Proc Zool Sec. 1800. p. 160

a According to Boulenger's count.

Genus NAJAa Laurenti.

- 1768. Naja Laurenti, Synops. Rept., p. 90 (type, Naja naja).
- 1830. Uraus Wagler, Nat. Syst. Amph., p. 173 (type, Naja haje).
- 1830. Aspis Wagler, Nat. Syst. Amph., p. 173 (type, Naja naja) (not of Laurenti, 1768).
- 1831. Tomyris Eichwald, Zool. Spec., III (p. 171) (type, T. oriana).
- 1836. Hamadryas Canton, Asiat. Research., XIX, p. 187 (type, II. hannah) (not of Huebner, 1806).
- 1843. Dendraspis Fitzinger, Syst. Rept., p. 28 (type, N. bungarus).
- 1858. Pseudohaje Guenther, Cat. Colubr. Snakes Brit. Mus., p. 222 (type, P. nigm).
- 1864. Ophiophagus Guenther, Rept. Brit. India, p. 340 (type, O. elaps).

One species of these deadly snakes occurs within our territory, inasmuch as the eastern representative of the terrible Indian cobra has been found in the extreme south of Formosa.

NAJA NAJA b ATRA c (Cantor).

- 1842. Naja atra Cantor, Ann. Nat. Hist., IX. 1842, p. 482 (type-locality, Chusan, China).
- 1859. ?Naja tripudians var. scopinucha Cope, Proc. Phila. Acad., 1859, p. 343 (type-locality, Canton River; type in Mus. Acad. Phila.; Doctor Ruschenberger, collector).
- 1860. Naja haji Hallowell, Proc. Phila. Acad., 1860, p. 504 (Hongkong) (not N. haje (Linneus)).
- 1866. Naja tripudians var. atra Martens, Preuss. Exped. Ost-Asien, Zool., I, p. 177 (Chusan Archipel.).
- 1867. Naja lutescens var. larvata Steindachner, Novara Exped., Zool., I, Rept. p. 81 (Hongkong) (not of Cantor).
- 1876. Naja tripudians var. unicolor Martens, Preuss. Exped. Ost-Asien, Zool., I. p. 382 (substitute name).
- 1885. Naja tripudians Bettger, Offenbach, Ver. Naturk, 24-25 Ber., pp. 127, 154 (Canton (not of Merrem); Ber. Senckenberg, Naturf, Ges., 1894, p. 134 (Hainan); p. 137 (Hongkong), WALL, Proc. Zool Soc. London, 1903, p. 97 (Hongkong; Hainan).
- 1896. Naia tripudians var. fasciata (part) BOULENGER, Cat. Snakes Brit. Mus., 111. p. 383 (Kinkiang; Canton; Hainan; Siam). "BOETGER, Kat. Schl. Mus. Senekenberg., 1898, p. 121 (Canton; Hainan) (not of Gray?).
- 1896. Naia tripudians var. sputatris (part) Boulenger, Cat. Snakes Brit. Mus., III. p. 384 (Chusan Ids.) (not of Boie).

In treating of the association of subspecies constituting the species Naia tripudians (= Naja naja) Boulenger d has attempted a subdivision based chiefly upon color differences. A glance at the list of 71 specimens given by him, shows that the "subspecies," or "varieties," or "forms" thus distinguished are not correlated with geographical distribution. In view of Doctor Boulenger's statement that "the

^a Said to be derived from Nag, the Indian word for snake.

b 1758. Coluber naja Lixxiius, Syst. Nat., 10 ed., I, p. 221 (type-locality, India orientalis); 12 ed., I, 1766, p. 382.

[«]Signifying black.

d Cat. Snakes Brit. Mus., 111, 1896, p. 381.

forms enumerated [by him] might be regarded as distinct species but for the absence of any sharp demarcation-lines between them," this lack of correlation might be explained. Nevertheless, even if we regard them as species, their geographical distribution becomes disconnected, confused, and unintelligible.

It seems that a better subdivision might have been obtained by taking the scale formula as a primary basis and color only as a second-

arv character.

It might then be possible to separate out a form Naja naja oxiana (Eichwald), from Transcaspia, Afghanistan, and Gilgit, characterized by a large number (averaging 268) of ventrals and caudals together, the sum of these giving more definite results than each separately, owing to the variable location of the vent.

The specimens from India proper, Ceylon, and possibly Burma and the Malay peninsula seem to be fairly well characterized by the large number of scales around the neck, 29 to 35, rarely 27, and

should probably stand as Naja naja.

The cobras from the Malay Archipelago have about the same average number of ventrals plus caudals as the Indian cobras (235 in the former as against 238 in the latter), but the number of scales around the neck is smaller, viz, only 21 to 25. These may be Boie's Naja naja sputatrix, or they may fall into several more subspecies.

Finally, the Chinese and Siamese specimens seem to hold an intermediary position so far as neck scales are concerned, viz. 25 to 27, but with a minimum of ventrals plus caudals (average of 9 specimens 216.) These are also fairly uniform in color and appear entitled to the

subspecific appellation Naja naja atra (Cantor).

The demarcation-lines here drawn up are not very sharp, but they seem better than those based primarily on color and have the advantage of a more rational geographic distribution than the others. Moreover, like Boulenger's scheme, this is only a provisional arrangement which needs to be tested with a very large material. In this connection I would earnestly warn against using specimens, to the origin of which there attaches the least suspicion. Only by utilizing material which in every detail is authentic and beyond dispute will it be possible to reach a satisfactory solution.

Description. Young, British Museum, No. 99.4.24 102; South Cape, Formosa; J. D. La Touche, collector. Rostral very broad, the height only two-thirds of the width; internasals somewhat longer than prefrontals; frontal pentagonal, broader than supraoculars; parietals as long as frontal and prefrontals together; nostril separating the two large nasals; no loreal; one prefrontal in contact with supraocular, prefrontal, internasal, posterior nasal, and third supralabial; diameter of eye as large as its distance from anterior rim of

nostril; two postoculars, upper much the larger; large temporals, 2 + 1; a large scale in the posterior angle between the parietals, and a larger one on each side of the parietals in continuation of the larger upper temporal; seven supralabials, third and fourth entering eye, third very high, broadly in contact with posterior nasal, fifth high, touching upper postocular; four lower labials in contact with anterior chin-shields which are larger than posterior pair; 25 scales round the neck, and 21 round the body; a 178 ventrals; and divided; 42 pairs of subcaudals. Color (in alcohol) uniform blackish brown, except sides and lower part of head, as well as 16 anterior ventrals, which are whitish; on the upper neck a pair of white-rimmed "spectacles" and 13 very narrow yellowish cross lines, the anterior of which is faintly indicated on the ventrals also.

As to how large the cobra grows to be in Formosa there is no infermation, but specimens from other localities are known to exceed.

Variation.—The species is subject to a considerable amount of variation as might be expected from its wide distribution. The more essential features of this have been touched upon in the preliminary remarks following the synomymy (see p. 394).

Distribution.—The species Naja naja has a wide distribution in southeastern Asia, from Transcaspia to the Philippines, but the present subspecies, as defined above, seems to be confined to China south of Shanghai, including Hainan, French Indo-China, continental Siam, and Formosa.

Its occurrence in Formosa is now demonstrated by a young specimen in British Museum collected near South Cape by Mr. J. D. La Touche. I owe the opportunity to examine and describe this specimen to the courtesy of Dr. G. A. Boulenger.

^a According to Boulenger's count.

Last of specimens of Naja naj	a atra	
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						-	
Museum. Number.	Sex and age.	Locality.	When collected.	By whom col- locted	Scale rows,	body.	Sulvandals. Veritalanlus subcaudal
			1854.				
U.S.N.M 7517	Female	Bongkong, China.		W. Stimpson	27	21	170 45 215
Brit. Mus. 99.4.24.102				*	1		178 42 220
print. 2015. 99.4124.102	roung	moss		3 D. Day 1 O. M.	444,51		100 12 140
Do., Da	Male b	Chusan Islands .		J. J. Walker, .	25	21	167
Do. , Db	Youngt	China		R. Lindsay	. 25	21	177 47 224
Do, Cha	Female c	Kiuklang, China		J. Walley	25	21	166 48 214
Do., Cbb	do. <	Canton			. 25	21	170
Do Che	do. e	Hainan Island		J. Neumann	25	21	168 43; 211
Sencken- 9383a	Adult	Canton		O Fr v. Moel-	(4)	21	162: 47 0
herg.				lendorff	1		1
Do. 93836	do. ∉	,,do		do	(1)	21	164: 50: 214
(*)	(d)	do		do	(4)	21	165
(*)	(d)	do		do	(01	21'	169
Brit. Musc. Chd	Male c.	Siam	.1		27	21	170 48 218
Do Cbe		do			27	21	174 47 221

e Description, p. 395.

Genus BUNGARUS "Daudin.

- 1803. Bungagus Dat DIN, Bull Soc Philom Paris, III, No. 72, March, 1803, p. 187 (type, B. fasciatus).
- 1811. Pseudo-hoa Opper, Ordn. Rept., p. 68 (type, B. fasciatus) (not of Schneider, 1801).
- 1828 Aspidoclonion Wagler, Icon. Amph., I, fol. 2 (type, A. semifasciatum).

BUNGARUS MULTICINCTUS & Blyth.

- 1858. Bungarus semifasciatus Guenther, Cat. Col. Snakes Brit. Mus., p. 221 (China) (not of Boie, 1827). Rept. Brit. India, 1864, p. 344 (China; Formosa) Swinhoe, Ann. Mag. Nat. Hist. (3), XII, 1863, p. 225 (Formosa; Amoy, China) Воеттоек, Offenbach. Ver. Naturk. 24–25 Ber., 1885, p. 128 (Canton).
- 1861. Bungarus multiciactus Blytti, Journ. Asiat. Soc. Bengal, XXIX, p. 98 (type-locality, Formosa; type in Calcutta Mus.; Swinhoe, collector). Boettobr, Offenbach. Ver. Naturk. 26-28 Ber., 1888, pp. 86, 148 (South China; Formosa).—Steineger, Journ. Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 222 (Taipa, Formosa).
- 1896. Bungarus candidus var. multicinctus Boulenger, Cat. Sn. Brit. Mus., III, p. 369 (China; Formosa; Burma); Proc. Zeol. Soc. London, 1899. p. 164 (Kuatun, Fokien, China) Bungarus candidus var. multicincta Boett-ger, Kat Schl Mus. Senckenberg., 1898, p. 119 (Canton)

Three closely-related forms of the "Krait" differing in color but apparently occupying distinct geographic areas are united by Bou-

⁶ Boulenger, Cat. III, p. 384.

[■] Boettger, 1885, p. 127

<25 to 27 scale rows round the neck, Boettger, I.c.

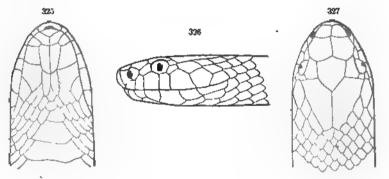
c Boulenger, Cat. III, p. 383.

^a Derived from "Bungarum-pamah," which according to Russell's "Indian Serpents" is the vernacular name for B fasciatus on the coast of Coromandel, India.
^b Signifying many-belted, i. e., with many crossbars.

lenger under the oldest name, B. candidus. The typical form seems to be confined to islands in the Malayan Archipelago; another, var. cæruleus, extends over entire India (exclusive of the Himalayas and Ceylon) and the Malay Peninsula; the third, the one here treated of, is recorded from Toungoo, in lower Burma, not far from the Karennee Hills, and from various localities in southern China. The first is considered most distinct, and there seems to be no good reason for connecting it nomenclaturally with our Chinese form. Of the Indian tropical form Boulenger says that it is "almost completely connected" with B. multicinctus. This "almost" only prevents me at present from speaking of the latter as Bungarus ceruleus multicinctus.

Another very closely allied form, differing chiefly in the less-pronounced enlargement of the median dorsal scale row, B. lividus, inhabits Assam. The Ceylon krait B. ceylonicus, is another nearly related form.

Description.—Adult male; Science College Museum, Tokyo, No. 15; Taipa, Formosa; November, 1897; T. Tada, collector (figs. 325–327). Rostral broader than high; visible from above; internasals,



Figs. 325-327.—Bungaris multiplietes nat size, 325, underside of head, 326, side of head, 327 for of head. No. 15, Set Coll. Tokyo

broader than long, half as large as prefrontals which are broadly in contact with supraoculars; frontal as long as its distance from tip of snout and interparietal suture twice as wide as supraoculars at center of eye; parietals much longer than frontal, nearly as long as their distance from tip of snout; nostril large, vertically elliptic, between two nasals, the posterior narrowed behind so as to meet the preocular in a very short suture; no loreal; one long preocular, anteriorly in narrow contact with posterior nasal; eye rather small, its vertical diameter shorter than its distance from edge of lip; two postoculars; temporals 1+2; seven supralabials, last three largest, second in contact with preocular, third and fourth entering eye; four lower labials in contact with anterior chin-shields which are longer than the posterior pair; 15 rows of smooth scales, without apical pits, the median row greatly enlarged, more than twice as large as the other dorsals; 210 ventrals;

anal entire; 46 undivided subcaudals. Color (in alcohol) above dark seal brown with 45 narrow whitish cross lines or bars, 31 on the body and 14 on the tail, about one scale wide on the back, widening near the belly so as to equal two of the outer scale rows, the light-colored lateral scales often with a median dark line; head uniform dark, somewhat paler on labials, underside whitish more or less clouded with brown, and the dark brown of the sides descending on the body over the ends of the corresponding ventrals, while forming continuous, though somewhat irregular, rings on the tail.

	Dimensions	
		12) 774
Total length		860
Shout to yent		743
Vent to tip of tail	*	117

The young (U.S.N.M. No. 36514) is essentially like the adult described above, but has a whitish crescentic mark on each side of the neck behind the head,

This species reaches a length of more than a meter.

Variation. The scale formula varies but little though 1+1 temporals occur besides 1+2. The ventrals vary in this form between 198 and 221, the subcaudals between 44 and 52.

The variation in coloration has reference chiefly to the number of white cross lines. Thus, the adult described above has 45, and the young 51 (40 on body 11 on tail), while as many as 60 have been recorded.

Habitat Southern China, from the provinces of Kiangsi and Fokien to Kwangtung and Kwangsi. Farther west it has been collected at Toungoo in Lower Burma, by Mr. E. W. Oates.

In Formosa it was first found by Swinhoe, and Mr Tashiro has since informed us that it is found both in the northern and southern part of the island. He states that it was common around Taipa, whence he brought two specimens.

List of speamens of Banga is walturneties

Museum No Sex no.1	Local 13	When collected	By where collected	Seat rina	Chemistrale Tamparale Saprahalials
		1807			
U.S.N.M., 36514 Young a	Тизьоки «Тигра	SOPE	1 444	55 210 1	48 1 2 1 + 3 7
	Fermesa				
Ser Cod. 15 Male b	Dilla Formasa	161	do	15c -10 1	46, 4,24+2 7
Tokyo					
Brit. M is Bc. Feingles	Formosa .		R. Swirhoc	15 207 1	44
				1	
# Se, Coll, No 3.	b Figs 325 327, des	er plaon ().	398. ¢ Be	waenger tat I	Π, p. 300.

Subfamily HYDRINAC .-

The high, compressed tail, shaped like the blade of an oar, distinguishes these snakes at once from all others and stamps them as inhabitants of the water. As a matter of fact these snakes are not only aquatic, but truly marine, some of them to an extent that renders it correct to designate them as pelagic.

Not only has the shape of the tail become specialized in these snakes, but the whole body is strongly compressed in some; in others the general shape has been greatly modified, so that the whole posterior portion of the body is abnormally enlarged while the front part is drawn out into an excessively elongated and narrow neck finished off with a small head not wider than the neck. Owing to the compressed form of the body the ventrals have been reduced in most of the forms to an extent which makes it difficult to recognize them as such. Even the scales of the body have become highly altered in many forms, being polygonal and juxtaposed with short keels or knobs or spines, sometimes in pairs, and totally unlike the scales of other snakes. That the nostrils are placed on top of the snout and provided with valves it is scarcely necessary to mention.

Not all the species are as greatly differentiated as above mentioned. A small group, the habits of which are still partly terrestrial, live near the shores and occasionally and temporarily climb among the rocks or even sometimes venture farther inland. These have still fairly well-developed ventrals to some extent fit for terrestrial locomotion, and their scales are imbricate. To this group belong the genera *Laticauda* and *Emydocephalus*.

Being "proteroglyph," all these marine snakes are poisonous. Nevertheless, several forms are perfectly harmless to man, such as the *Laticauda* occurring so frequently around the Riu Kiu Islands which the fishermen handle without fear and without accident.

The sea snakes, broadly speaking, inhabit all the tropical and subtropical seas outside of the Atlantic Ocean. In spite of much good work of late in this group, the species and their distribution are as yet but poorly understood. The lack of definite boundaries to their habitat and their liability to be carried beyond their natural limits by currents make it difficult to decide how many species to include in the present work. It has therefore been thought best to take cognizance of a few more species than have actually been recorded from the coasts of the territory covered by this work, when they are known to occur in the adjacent seas. Such species, however, have been included in brackets.

Doctor Boettger, in 1888 (Zool. Anz., pp. 395 seq.), published a paper on the external sexual characters of the sea snakes based upon an examination of 46 specimens belonging to two genera (Disteira and Lapencis), all from the Philippine Islands. He came to the con-

clusion that the males differ in having fewer ventrals, fewer scale rows around the neck, more anals, longer tail and smaller circumference of body relative to total length, and much more developed spines on the ventrals. In all three species examined by him he found a difference of about 20 ventrals between the maximum of the males and the minimum of the females. Thus in Lapemis hardwickii (Hydrophis lorcatus) he found in the males 135-168 ventrals (average 153) and in the females 186-237 (average 202), the difference between the averages being 49 ventrals. His result was calculated to carry conviction as it was based upon a series of no less than 31 specimens. Nevertheless, if we inquire into the data furnished by Boulenger regarding the specimens of the same species in British Museum a we find in a much smaller series (14 specimens, 5 males and 9 females) proportions essentially different. In his list the ventrals of the males range between 130 and 155 (average 140), those of the females 136-200 (average 156), consequently an overlap of 19 ventrals instead of a gap of 18. The British Museum specimens are not from one locality, however, but cover the whole area from India to the Philippines, and it might be supposed that this discrepancy had a geographical significance. Such is not the case, however, for three females from Negros, Philippine Archipelago, consequently from practically the same locality as Boettger's specimens, have 140, 156, and 180 ventrals, respectively, thus nearly covering the whole range of Boettger's 18 males (135-168) without reaching the minimum of his 13 females (188).

These apparent discrepancies seem at present inexplicable, and indicate one of the many difficulties with which the student of these snakes has to deal.

My own observations bear out Boettger's conclusions only partly. In our four specimens of *Disteira godettroy*: the female has more scale rows, more ventrals, and fewer subcaudals. On the other hand, in 20 specimens of *Disteira melanocophala* there is apparently no difference among the sexes except that the males average a few more subcaudals than the females.

KEY TO THE GENERA OF HYDRINA IN JAPANESE AND CHINESE WATERS.

at Ventrals wide at least four times as wide as long

b Nasals widely separated by internasals supralability normal. Late anda p. 402,

a2 Ventrals rudinaentary. less than twice as wide as long

b) Two pairs of chin shields anterior always, posterior nearly always in contact Distoration 448

& Chin-shields scarcely differentiated not in contact

-tar Sn Brit Mas, III p 301.

- c^1 Snout, from eye to tip shorter than width of head at posterior corner of supraoculars.

 - d² Mental concealed in a deep groove of the chin........... [Enhydrina], p. 437.

Genus LATICAUDA Laurenti.

- 1768. Laticauda LAURENTI, Syn. Rept., p. 109 (type, L. scutata).
- 1802. Platurus LATREILLE. Hist. Nat. Rept. IV, p. 183 (type, P. fasciatus).

Five species of this genus are provisionally recognized, of which Laticauda muelleri b seems to be a L. laticaudata with a ventral keel. A Laticauda frontalis has recently been described as differing from L. semifasciata in having an undivided rostral and shield-like temporals.

Only two species are known with certainty to have been taken on the coasts of the territory covered by this work, but a third may be reasonably expected to occur and its characters are therefore given in conjunction with the others. They may be distinguished by the following:

KEY TO THE SPECIES OF LATICAUDA IN JAPANESE AND CHINESE SEAS.

- a¹ Rostral undivided horizontally; belly without a median keel; two pairs of contiguous chin-shields; temporals 1+2; top of snout yellow.
 - b¹ Scale rows 19; no unpaired shield between the prefrontals; upper lip dark brown.
 L. laticaudata, p. 402.
- a² Rostral divided horizontally; belly with a median keel on posterior half; one pair of contiguous chin-shields; temporals 2-4-3; top of shout dark brown.

L. semifasciata, p. 409.

LATICAUDA LATICAUDATA d (Linnæus).

1758. Coluber laticandatus Lanneus, Syst. Nat., 10 ed., I, p. 222 (part: type-locality, the Indies: type in Mus. Stockholm:; 12 ed., I, 1766, p. 383.—Andersson, Bihang Svensk, Vet. Akad. Handl., XXIV, 1899, Pt. 4, no. 6, p. 18 (type).—Platurus laticandatus Girard, Herpet, U. S. Expl. Exped., 1858, p. 180 (Fiji 1s.). Peters, Mon. Ber. Berlin Akad. Wiss., 1877. p. 417 (part: Fiji, Tonga, Philippine Is.).—Boulenger, Cat. Sn. Brit. Mus., 111, 1896. p. 307 (Bay of Bengal to western Pacific; Loo Choo Islands).—Wall. Proc. Zool. Soc. London, 1903. pp. 96, 401 (Formosa; Loo Choo Islands): 1905, II, p. 517 (Okinawa).

1768. Laticanda scutata Laurenti, Syn. Rept., p. 109 (substitute name for C. laticandatus Linnieus).

a From latus, broad; canda, tail.

b Platurus muelleri Boulenger, Cat. Sn. Brit. Mus., 111, 1896, p. 309 (South Pacific).

c Platurus frontalis De Vis, Ann. Queensland Mus., No. 6, 1905, p. 48 (New Guinea).

d From latus, broad; candatus, tailed.

1802 Platurus fasciatus Latrellle, Hist Nat Rept., IV, p. 185 (Indies - Fischer, Abh Naturw Ver Hamburg, III., 1856 pp. 28, 70 part special Hamburg Mus., Indian Ocean. Hallowell, Proc. Phila Acad., 1860, p. 493 Nahs, Okinawa shima. Bot lenger Proc. Zool. Soc. London, 1887, p. 149. Loo Choo Islands.

1817, Platurus laurenti RAFINESQUE, Amer Month. Mag., I, p. 432 substitute

name, not of Daudin, 1803)

1836 Coluber platycandatus Oken, Allgem, Naturg , VIII, p. 566 clapeus

1858 Platurus laticaudatus var Grenther, Cat Colubr Sn. Brit. Mus., p. 272

(New Guinea, Bengal, Siam Van Diemen's Land).

1859 Platieus fischeri Jen, Rev. Mag Zool. 1859 (р. 149. author's separate, р. 25, pl. р (type-locality, Indian Ocean, type in Mus. Milano. Teon. Opliid., livr. 40, 1872, pl. t. fig. 2. (type). - Стективис, Rept. Brit. Lidia, 1804, р. 356, pl. xxv. fig. с. (Bengal. Stam., New Guinea, New Hebrides Anderson, Proc. Zool. Soc. London. 1871. р. 189 (Calcutta.).

1871, Platieus affinis Anderson, Proc Zool. Soc. London, 1871, p. 190, type-locality. Fallahs Mullah, Calcutta. type in Ind. Mus. Calcutta.

The Coluber laticaudatus of Linnaus (Syst. Nat., 10th and 12th editions) was based upon his account of the same species in Museum Adolphi Frederici, which was published in 1754 and not binominal. Two specimens were apparently described in that work. It now turns out from Andersson's examination of the types a that Linnaus had before him a specimen of each of the two species lately known as Platurus laticaudatus and P colubrinus, the former with 19 scale rows, the latter with 23. His C laticaudatus is consequently a composite species, and the application of the name by the first reviser who separated the component forms must stand.

The two species were steadily confounded by all authors, just as Linnaus had done, though under various names, such as Platurus fasciatus and Hydrophis colubrinus, until 1858, when Girard, for the first time (and not Peters in 1877, as occasionally stated), clearly separated, described, and named them. He tied the name laticaudatus, which had scarcely been used at all in the herpetological literature since the time of Linnaus, to the species with 19 scale rows, and applied Hydrus colubrinus of Schneider correctly to the other, this being the oldest name used for a specimen of the latter, though Schneider himself did not realize its distinctness from the Linnaus species, of which, as we have seen, in reality it only formed a part. Girard's nomenclature has been followed by nearly all subsequent writers.

The fact that Linnæus in the Systema Naturæ only gives the scale formula (i. e., number of ventrals and subcaudals) of the specimen with 23 scale rows (220-42) is not sufficient reason for fastening the name *C. laticaudatus* to the species represented by this specimen, in view of the above argument, and is, moreover, sufficiently set off by

[&]quot;Bihang Svensk Vet Akad Handl, XXIV, 1899, Pt 4, No. 6, p. 18.

his reference to the plate in Museum Adolphi Frederici, which is said to represent the other specimen.

Whether the above synonymy includes one or more distinguishable forms may perhaps yet be open to question; at least I have not been able to fully make up my mind from our material which is entirely too insufficient, however. As far as it goes it seems to indicate two color forms. At least our specimens can be divided according to the following concurrent color characters, thus:

a² Light horseshoe shaped mark not bent down behind the eye; usually two light rings on neck incomplete below, light rings on helly 1-3 ventrals wide.

L. laticaudata affinia (Nos. 30761, Pulo Mansular, W. Sumatra, 7381, Riu-Kius., 21309, China Seas, 32669, Formosa, 33937, 41, Riu-Kius.).

It should be noted that our eastern specimens belong to *L. affinis*, and it would be interesting to know to what extent the characters mentioned above hold good in a large series. In this connection it may be stated that the character of the incomplete light rings on the neck below is the least constant, as might be expected. It holds in seven of our nine specimens of *L. affinis*, but two of the Riu Kiu specimens (Nos. 33937 and 33939) have only one incomplete ring.

Since the above was written I have examined two specimens from Formosa in the Christiania Museum (No. 832) which in the main bear out the above.

Description (figs. 328-330). Adult male; U.S.N.M. No. 32669; Formosa; 1894; Mr. Navara, collector. Rostral undivided, higher than broad, just visible from above; internasals broader than long, nearly triangular, their suture with rostral very short; prefrontals in contact throughout, anteriorly very broad with an acute outer angle descending on side of face between nasal and preocular without quite reaching the second supralabial, broadly in contact behind with supraocular; frontal long, pointed behind, much longer than distance from tip of shout; as long as parietals, broader than supraoculars; parietals short, not longer than frontal, the suture between them shorter than distance between frontal and rostral; nostril in the posterior half of an undivided nasal which is three times as long as high, slightly lower in front and narrowly in contact with preocular beneath the prefrontal; one preocular; eye small, its diameter less than its distance from edge of lip; 2 postoculars; temporals 1 + 2, slightly larger than the adjoining labials, 7 supralabials, first much wider above than below, third and fourth entering eye; mental very small, smaller than first lower labials; 7 lower labials, the last four exceedingly narrow, three anterior only in contact with anterior chin shields which are somewhat smaller than the posterior, the latter broadly in contact; 19 rows of smooth scales without apical pits; 243 ventrals; anal

divided; 47 pairs of subcaudals. Color (in alcohol) bluish gray above, yellowish underneath, with broad blackish brown rings around the body, there being 47 on neek and body and 5 on tail, the first on neck incomplete below; width of black rings above about four scale rows and about three ventrals underneath, the light interspaces



Figs. 328-330.—Laticauda Laticaudata. 2 < mat size 328, top of head. 329, side of head; 330 underside of head. No 730, US N M

respectively 21 above and 2 below; head blackish brown, rostral, snout, and eyebrow region as far as anterior angle of parietal and first temporal, yellow; labials brownish black as well as throat and lower neck, the latter with a median line of yellow.

	Dunensi	1948		
				1070
Total Length				769
Snout to yent	,			659
Vent to tip of tail				110

The female and young are essentially like the above, the former somewhat larger with a shorter tail, No 33937, for instance, our largest specimen, measuring 890 mm, with a tail 95 mm, long.

Variation The scale formula is fairly constant in this species, oculars, temporals, supralabials, and anal showing no deviation from the normal in a large series. In the specimens recorded from the waters adjacent to our territory the ventrals vary between 230 and 243, the subcaudals between 30 and 47.

As for the color variation of this species it is sufficient to refer to the preliminary remarks (on p. 404). The number of black rings on the body in ten specimens from Japanese waters ranges between 39 and 55.

Habitat.—Widely distributed along the coasts from India to the South Pacific islands and Tasmania The species seems common about the Fijis and the Friendly Islands, and Fischer mentions a specimen from the Society Islands.

On the coasts of southeastern Asia it is not rare—for instance, in the Philippines—and to the north it has been found as far as Okinawa shima. A specimen from Naha, collected by Heme, of the Perry

Expedition, was recorded by Hallowell (U.S.N.M. No. 7381), and two specimens obtained by Pryer's collector, probably in the same island, are in British Museum. Two other specimens, also from Okinawa shima, are in the Imperial Museum, Ueno Park, Tokyo (Nos. 11, 12), as well as one from the Yaeyama group (No. 13). In the latter it must be common, for we have five specimens from Ishigaki shima through Mr. Owston, and British Museum has one from the same locality and collector through Doctor Wall. Similarly on the coasts of Formosa, whence I have examined two in the University Museum of Christiania, collected by Mr. Navara, and one from the same source in our own museum, obtained through the kindness of Prof. Robert Collett.

		_		,								
Museum	No	Sex and age.	Locality.	When coi- lected	By whom collected or from whom obtained	Seale rows	Ventrals.	Subcandals.	Black rings on body.	Oculars.	Temporals	Supralablala.
				1853.								
U.S.N M	7381	Young a	Naha, Okinawa shima		W Heine.	19	232	45	56	1,2	1+2	7
Do.	21399	do	China Sea (*).			19	242	43	48	1,2	1+2	7
Do	72699	Maleb	Formosa	1894 , 1899,	Navatu	19	243	47	40	1,2	1+2	7
Рο	33937	Female	Ishigaki shima	May-June	A. Owston	19	237	34	49	1,2	1+2	7
Do	33938	do	do	do	do	19	237	33	51	1,2	1+2	7
Do	33939	do	do	. do, ,,	do	19	234	33	46	1,2	1+2	7
Do	33940	. do	do	do	do	19	238	32	50	1,2	1+2	7
Do	33041	Male	do	tlo	្ន៥១	19	238	38	45	1,2	I + 2	7
Christiania.	8320	Young	Fоттовн ,	1444	Navara	19	235	44	39		. '	
Do.	8326	Male	do.	do	do	19	237		43			
Brit, Mus	19		lebigakt shimii		Doctor Wall	19	230	41				
Do	٢	Fentale s	Loo Choo Is- lands.	-	HJ & Pryer	19	233	30				
Do.	d	Younge	do		do	19	26	31				

List of specimens of Laticauda laticaudata.

[LATICAUDA COLUBRINA a (Linnæus).]

1758. Coluber laticaudatus Linnæis, Syst. Nat., 10 ed., I., p. 222 (part); 12 ed., I., 1766, p. 383 — Platurus laticaudatus Peters, Mon. Ber. Berlin Akad. Wiss., 1877, p. 417 (part. Philippines, Amboina; Fip. Is.; New Hanover).
1799. Hydrus colubrinus Schneider, Hist. Amph., I. p. 238 (type-locality not stated, type, no. 9078. Berlin Mus.). — Hydrophis colubrinus Schlegel, Phys. Serp., II. 1837, p. 514, pl. xviii, figs. 21-22. Moluccas, Timor, Celebes, China Sea). Platurus colubrinus Girard, Herpet. U. S. Expl. Exped., 1858. p. 183 (Fip. and Tonga Is.).—Bollenger, Cat. Sn. Brit. Mus., 111, 1896, p. 308. Boettger, Kat. Schl. Mus. Senckenberg., 1898. p. 114 (Philippines Luzon, Cebu; Ternate, Tonga Tabu; Australia).—Wall., Proc. Zool. Soc. London, 1903, p. 101.

Figs 328-330.
 Description, p. 404.

Boulenger, Cut. 111, p. 308.

a Signifying colubrine, like a Coluber; so named by Schneider because Linnseus had referred the species to that genus

1803. Platurus fasciatus Daudin, Hist Nat. Rept , VII, p. 226 . part), pl LXXXV. fig 1 Jan, Icon. Ophid livr. 40, 1872, pl. r, fig. 1 New South Wales.

1847 Lateraida scatata Canton, Journ Asiat Soc Bengal, XVI (p. 1046) not of Laurenti Platurus scutatus Guenther, Rept. Brit. India, 1864, p. 356. (Bay of Bengal to Chinese seas and New Zealand),

1856. Platurus fusciatus var colubrina Fischer, Abn Naturw Ver. Hamburg,

III, p 30.

1858, Platueus laticandatus var a Guenther, Cat. Col. Sn. Brit. Mus., p. 272 Fig. Is., Amboing Sulu I. Isle of Piner India).

1885 Platurus taticaudatus var colubrina Boetroen, Offenbach. Ver. Naturk. 24 25 Ber , p. 155 , China Sca).

Description.—Halfgrown; U.S.N.M. No. 15236; China Seas; J. G. Swan, collector. Rostral one-third higher than broad, scarcely visible from above; a pair of internasals narrowly in contact with rostral; three prefrontals, the median unpaired shield pentagonal, entirely separating the lateral ones, broadly in contact with the internasals in front and the frontal behind; frontal long, as long as parietals, much longer than its distance from tip of snout, wider than supraoculars; parietals short and broad, the two dimensions about equal; nostril large, behind the middle of a long and narrow undivided nasal which is broadly in contact behind with preocular and third supralabial; one high preocular; diameter of eye equaling its distance from edge of lip; two postoculars; 1+2 temporals, a small supernumerary shield being interpolated on the left side between anterior temporal and fifth and sixth supralabials, 7 supralabials, first somewhat broader above than below, sixth largest, third and fourth entering eye; mental very small and narrow; only anterior two lower labials reaching chin-shields, the posterior ones being very low, scarcely more than covering the labial edge; two pairs of chin-shields in contact throughout, posterior pair larger than anterior; 25 rows of smooth scales without apical pits; 230 ventrals, without median keel, anal divided; 32 pairs of subcaudals. Color (in alcohol) gray above, each scale pale at tip, yellow on sides and below, with 28 solid blackish brown rings around the body and 3 on tail, the rings being widest (about 5 scale rows) on middle of back, narrowest (about 1) ventral) on belly. the pale interspaces above averaging about 4 scale rows in width, and 6 to 7 ventrals on underside; a broad yellow band from sides of neck across occiput, two scale rows behind parietals; head in front of this nearly to anterior edge of frontal blackish brown; snout, a superciliary line, entire upper lip and tip of lower lip yellow; a black band narrowly surrounding eye and extending over lower postocular and temporals, lower lip also blackish brown, the black of top of head, postocular band, and lower labial band united by a vertical black band behind angle of mouth.

Dimensions.

	774 FF .
Total length	692
Snout to vent	626
Vent to tip of tail	66

Adult specimens of this species are known having reached a length of nearly 1,300 mm.

Variation.—As in the other species of this genus the scale formula is very constant. A specimen (No. 149) from Queensland, in the Zoological Museum in Christiania, which I was allowed to examine through the kindness of Prof. Robert Collett, is remarkable for lacking the azygous shield between the prefrontals, thus resembling L. laticaudata in this respect, though otherwise a normal L. colubrina, as shown by its 23 scale rows and yellow supralabials.^a

Habitat.—No specimen has been recorded from any definite locality within the limits of this work.^b There are in collections, however, several specimens said to have been taken in the "China Seas," or "China Sea." As the latter is bounded by Formosa in the north, while on the other hand the range of this species mostly coincides with that of L. laticaudata, it seems quite probable that L. colubrina may be found in the seas about Formosa and the Riu Kius now that attention has been called to it.

As stated above, its general distribution is almost identical with that of *L. laticaudata* inasmuch as it is found from the Bay of Bengal to the western part of the South Pacific at least as far east as the Friendly Islands, extending southward to Australia and New Zealand.

List of specimens of Laticauda colubrina.

U.S. N. M. No.	Sex and age.	Locality.	When col- lected.	By whom collected or from whom re- ceived.	Scale rows.	Ventrals.	Subcaudals.	Dark rings on body.	Oculars.	Temporals.	Supralablais.
15236	Halfgr.a	China Seas		J. G. Swan	25	230	32	28	1. 2	1-2+2	7
			a Descri	ption, p. 407.							

a Dr. Franz Werner (Mitt. Zool. Samml. Mus. Naturk. Berlin, I, Pt. 4, 1900, p. 104) mentions a similar specimen in the collection of the Vienna university, but he regards it as a hybrid between L. laticaudata and L. colubrina, a view I can not accept, at least for the specimen in the Christiania Museum, which is in every respect a typical L. colubrina, but lacking the unpaired prefrontal.

b Doctor Wall enumerates the species as No. 25 of his "List of Japanese and Loo Choo Islands Ophidia," but gives no reference to any record in substantiation.



LATICAUDA SEMIFASCIATA. FROM TEMMINCK AND SCHLEGEL.)

FOR EXPLANATION OF PLATE SEE PAGE 555



LATICAUDA SEMIFASCIATA a (Reinwardt).

ERABU-UNAGI.

Plate XXII.

- 1837. Platurus semifacciatus Reinwardt, in Schlegel, Phys. Serp., II, p. 516 (typelocality, Moluccas; type, Leiden Mus. No. 1468; Reinwardt, collector).
- 1837. Hydrophis colubrina Schlegel, Phys. Serp., Atlas, pl. xviii, figs. 18-20; Fauna Jap., Rept., 1837, p. 92 (Liukius); Ophid., pl. x b (probably Reinwardt's type).—Platurus colubrinus Fischer, Jahrb. Wiss. Anst. Hamburg, V, 1888, p. 18 (Okinawa shima; Tonga; Society Is.).
- 1856. Platurus fasciatus var. semifasciata Fischer, Abh. Naturw. Ver. Hamburg, III, p. 30, p. 70 (Reinwardt's type).
- 1860. Platurus fasciatus var. Hallowell, Proc. Phila. Acad., 1860, p. 489 (Loo Choo; Cleopatra I.).
- 1874. Platurus schistorhynchus Guenther, Proc. Zool. Soc. London, 1874, p. 297, pl. xlv, fige B (type-locality, Savage Island; types in Brit. Mus.).—Boulenger, Fauna Brit. India, Rept., 1890, p. 395 (China Seas); Cat. Sn. Brit. Mus., III, 1896, p. 309 (Savage I.; Loo Choo Is.).—Wall. Proc. Zool. Soc. London, 1903, p. 101 (Loo Choos); 1905, II, p. 517 (Miyako; Okinawa; Amami).
- 1876. Platurus fasciatus Hilgendorf, Mitth. Deutsch. Ges. Ost-Asiens, I, heft 10, pp. 30, 31 (Prov. Satsuma) (not of Latreille).—Doederlein, Mitth. Deutsch. Ges. Ost-Asiens, III, heft 24, July 1881, p. 149 (Amami-o-shima); heft 25, Dec. 1881, p. 210 (Liukiu Is.: Erabu shima).—Okada, Cat. Vert. Japan, 1890, p. 69. (Okinawa shima).
- 1876. Platurus laticaudatus Peters, Mon. Ber. Berlin Akad. Wiss., 1876, p. 534 (Matuka, Fiji Is.) (not of Linnæus); 1877, p. 417 (part: Berlin Mus. No. 9663, Tonga; 9071, Samoa).

Reinwardt's P. semifasciatus must take precedence over Guenther's P. schistorhynchus. I have examined Reinwardt's type in the Leiden Rijksmuseum (No. 1468; probably the same individual which Schlegel has figured, Fauna Japonica, pl. x, especially fig. 2) from the "Moluques," and find it an unquestionable specimen of this species, with divided rostral, one pair of adjacent chin-shields, and keeled posterior ventrals.

Concurrent with the two apparently disconnected habitats of this species there seems to be an average difference in the number of ventrals. Thus in the eastern group (Tonga, Savage I.), in six recorded specimens the ventrals vary between 177 and 202 (average 187), while in eight western specimens (Riu Kius, Moluccas), they vary between 197 and 212 (average 205). Unfortunately there are two other specimens recorded which to some extent spoil this harmony, viz, one from the Riu Kius recorded by Boulenger with only 188 ventrals, the other, from the Society Islands, recorded by Fischer, with no less than 229 ventrals. With regard to the latter, I am

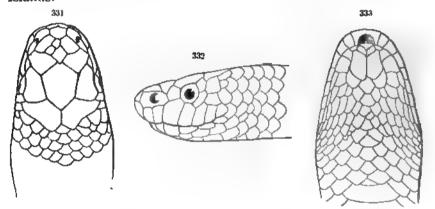
a From scmi-, half; fasciatus, banded.

b Reproduced in this work on Plate XXII.

c Cat. Sn. Brit. Mus., III, p. 309: specimen c.

d Jahrb. Wiss. Anst. Hamburg, V, p. 19: Hamburg Mus. No. 384.

strongly inclined to doubt either the accuracy of the count, the locality, or the identification, the number being so out of all proportion. I may finally remark that in the only Savage Island specimen examined by me (U.S.N.M. No. 28194) the number of light body rings is only 23. Guenther, in the original description of his Savage Island specimens, also gives 22 as the number of the body rings. In our Riu Kiu specimens the number of body rings varies between 35 and 43, and in the type of L. semifusciata the number is apparently about 38. No detailed record of the other specimens is accessible. It is consequently at the present moment impossible to decide whether we really have to do with two separable races, one with an average number of 205 ventrals and 38 body rings, typical L. semifasciata, from the Riu Kius and the Moluccas, and another form averaging 187 ventrals and 23 body rings, L. semifasciata schistorhynchus, from the Friendly Islands.



Figs. 331-333. Laticacida semifasciata $-14 \times$ nat size -331, top of head, 332, side of head, and -333, underside of head. No. 7515, U.S.N.M.

Description (figs. 331-333).—Halfgrown; U.S.N.M. No. 7336; Yoko shima (Cleopatra Island), Tokara group, Riu Kiu Archipelago; May, 1855; Captain Stevens, collector.—Rostral broader than high, upper edge broad and truncate, scarcely visible from above; three internasals, one unpaired anterior adjoining the rostral, of which it is in reality only a detached portion, and two posterior normal ones broadly in contact; three prefrontals, a median pentagonal one, posteriorly broadly in contact with frontal, and two lateral ones, broadly in contact with frontal and with supraocular; frontal large, much longer than its distance from tip of snout and than the parietals, supraoculars as broad as frontal at the middle; parietals very short, not longer than broad, much shorter than frontal; nostril large, semilunar, near the middle of the long and narrow undivided nasal; no loreal; one preocular, broadly in contact with masal; eye rather small, its vertical diameter less than its distance from edge of lip; two postoculars:

temporals 2 + 3, only slightly differentiated from the adjacent scales: seven supralabials, third and fourth largest and entering eye, first as wide above as below: seven lower labials, of which the first pair behind the small mental does not reach the edge of the lip, the labials from the third backward very low, only the first three in contact with chinshields, of which only the anterior pair is clearly differentiated, the posterior being represented by two scales separated by one of nearly the same size; 23 rows of smooth scales without apical pits; 205 ventrals, on the posterior half of the body by a median blunt keel and a corresponding notch in the posterior edge of each scute; anal divided; 40 pairs of subcaudals. Color (in alcohol bhuish gray, darker above, paler underneath, with 43 dark brown rings around the body and seven on the tail, the bands being widest on the median line of the back, viz, about 31 scales wide, and there separated by a pale interval only two scales wide; the rings are about 24 ventrals wide on the underside and the light intervals about the same width; head uniform dark brown, with a yellowish horseshoe-shaped mark, the convexity of which rests on the prefrontals extending backward on the outer edge of supraoculars, upper postocular and upper temporals to and joining the first pale cross line on occiput a scale row behind the parietals; shout and labials dark brown like the rest of the head.

	Dimensions		
			mm
Total length.			 582
Snout to vent		+	507
Vent to tip of tail			75

The young (in alcohol) are of a light bluish gray with blackish brown rings and markings. The latter as the snake grows larger become lighter and the former darker and browner, while the demarcation between them becomes more obscure until in very large specimens the markings become almost obliterated. In the larger specimens therefore the dark gray cross markings correspond to the whitish cross markings in the young.

This species grows to a considerable size. The largest specimen in our collection (No. 5546) measures 1,097 mm, in total length, with a tail 136 mm, long, while the type measures, respectively, 1,118 mm, and 140 mm

Variation. There is very little variation in the scale formula proper, for only in one specimen (No. 5546) have I seen 4 temporals on one side, the normal number of 3 occurring on the other. In eastern specimens the number of ventrals is rarely as low as 188, but ranges usually between 197 and 212, while the subcaudals vary between 32 and 43 pairs. Sometimes anomalies are found in the internasals; thus in No. 10b of the Imperial Museum, Tokyo, there is a small unpaisheld behind the detached part of the rostral, broadly in con with it and with the unpaired median prefrontal, and in our No.;

there are two unsymmetrical shields detached from the left internasal, as shown in fig. 331.

The variation in color and pattern has been referred to above (pp. 410 and 411).

Habitat.—Thus far this species has been recorded from only two disconnected areas very far apart, namely, from the Malay Archipelago (Amboina, according to Peters, and the type from the "Moluccas") and the Riu Kius in the west and from the Fiji, Samoa, and Tonga (Friendly) islands, the neighboring isolated Savage Island, and possibly the Society Islands in the east. No specimen from the intervening seas have been recorded, so far as I know.

In the Riu Kius this species appears to be common, as it can scarcely be doubted that this is the species of which Doederlein speaks as Platurus fasciatus, and which according to him is caught in considerable numbers at Erabu shima, in the northern group, so numerous in fact that the snake takes its name, Erabu-unagi, from that island, whence it is shipped to Japan to be used as a medicine. The Rogers Expedition brought home three specimens from Yoko shima (Cleopatra Island), which lies between the Tokara (Linschoten) group and Amami-o-shima, where Doederlein collected it. The Imperial Museum in Tokyo has specimens from Okinawa shima, where Doctor Warburg and Pryer's collector also obtained it. Doctor Wall mentions 29 specimens collected at Miyako shima. Finally, I have examined a specimen in the Hamburg Museum (No. 2633), collected by Doctor Lenz in Iriomote shima of the Yaeyama group.

Last of	specimens of	Laticano	ta semi	ifasciata.
1				

Museum.	No.	Sex and age.	Locality.	When collect- ed.	By whom collected or from whom received	Scule rows.	Ventrals.	Subcaudals.	Dark rings on body.	Oculars.	Temporals.	Supralablals.
U.S.N.M	5546	Female .	Cleopatra Isl	1	U.S. Expl. Exped.(?).		197	32	ا ا	1,2	2+37	7
1	1	,		1855.		'						
Do	7336	Halfgr.a	do	May —	Capt. Stevens	23	205	40	43	1,2	2+3	7
Do	7380	Young	Loo Choo		W. Stimpsonb.	$23^{!}$	204	4()	37	1,2	2+3	7
Do	7515	Female b	Cleopatra 1sl	May -	Capt. Stevens	23	201	37	35	1,2	2+3	•
Imp. Mus.	$10^{a^{\dagger}}$	Halfgr	Okinawa shima			$\frac{1}{23}$	212	43	37	1,2		l
Tokyo.	,					•						•
· ·	105	do	do			23	208	41	$\frac{1}{35}$	1,2	2+3	J -
Hamburg.	ı		Okinawa shima			23	210	41		•	- 1 1	•
					burg.	i			<u> </u>		,	
				1897.	C.	, 1]	•
Do	2633	Adult	Iriomote shima	1	Doctor Lentz.	23			!			!
1			Loo Choo Is					36				j
						i	•	•••			• • • • • •	1

a Description p. 410.

b Probably "No. γ-198. Hydrophis? Taken off the south end of Loo Choo, December, 1854. by Captain Rodgers" of Stimpson's MS. Catalogue. In the Museum register the entry is only as above. c Figs. 331-333.

d Fischer, 1888, p. 18.

Genus EMYDOCEPHALUS Krefft.

1869. Emydocephalus Kreff Proc Zool Soc London, 1869, p. 321 (type, E. annulatus).

Boulenger, with specimens of another species of this genus before him, still persists (Willey, Zool. Results, 1898, p. 57) in placing these snakes in the genus Aipysurus which he has diagnosed as having the "maxillary a little longer than the ectopterygoid [transpalatine];" "poison-fangs . . . followed, after a short interspace, by 6 to 10 grooved teeth."

In the genus *Emydocephalus*, on the contrary, the maxillary bone is shorter than the ectopterygoid, very much as in *Laticauda* (see Boulenger, Fauna Brit. India, Rept., p. 394, fig. 116A) even slightly more reduced. Behind the fang there is no trace of another tooth, such as is found in *Laticauda*, not even an impression on the surface of the bone. Add to this the remarkable and apparently constant fusion of the median labials, which some authors might regard as a good generic character in itself, and the status of *Emydocephalus* seems assured. So far as I can see, it is more closely allied to *Laticauda* than to *Aipysurus*, the chief difference being the presence of internasals and the consequent more lateral position of the nostrils.

The genus, which is as yet but very poorly known, seems to contain three species, the one here described, from the Riu Kiu and Formosan waters; E. chelonicephalus, from the Loyalty Islands; and E. annulatus, with single anal, and strongly tuberculated scales, from a

locality, probably somewhere in Australian waters.

In discussing the specific characters of the species constituting the genus Aipysurus, Doctor Guenther^b speaks of the head shields being much subdivided in old examples, implying that they are not so much subdivided in the young. While our present species is not strictly congeneric with those treated of by Doctor Guenther, it seems nearly enough related to make it proper to question the above inference. I have before me an adult female with two embryos ready to be expelled, and in all three the scutellation of the head is so identical that the conclusion seems justified, that no change takes place as the snake grows older, and that where a difference occurs it is due either to individual or to specific variation.

EMYDOCEPHALUS IJIMÆ: Stejneger.

1898. Emydocephalas rima Steineagh Journ Sci. Coll. Tokyo, XIII, Pt. 3, p. 223 (type-locality Rin Kin Sca. type 1 .8.N M No 3051. Tashiro, collector)

1899. Appyrar annialatas Box lenger, Zoof, Record for 1898. Rept. Bate. p. 21 (not of Krefft) — West. Proc. Zoof. Soc. London, 1903, pp. 95, 104. P. 11, p. 517. Okumwa)

a From luis, turtle; κεφαλή, head

b Rept Brit, India p 357.

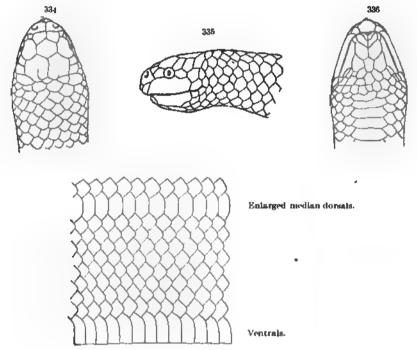
Named in honor of Prof. Isao ljuna. Science College, Imperial University, Tisk

It has been intimated by Boulenger (Zool. Rec. for 1898, Rept. Batr., p. 21) that this species is identical with Krefft's E. annulatus (of unknown habitat) and Bavay's E. chelonicephalus, from the Loyalty Islands. I shall express no opinion here as to whether he is right in thinking it "advisable to consider, provisionally, at least," the latter which has a rostral bearing a conical, spine-like tubercle to be the same species as Krefft's snake, a but I must dissent most emphatically from having E. ijimæ included with any of them. Its four prefrontals, divided anal, enlarged posterior vertebrals and smooth scales seem at once to forbid such a procedure, notwithstanding the fact that all the specimens of this genus show a remarkably small range in the number of their ventrals. That we have not to do with individual or sexual variations is proven by the fact that I have seven specimens, mature ones of both sexes as well as young ready to be born, which agree in all essential points. They all possess the enlarged vertebrals and four prefrontals, thus making out a pretty conclusive case for the distinctness of this species. Doctor Wall, who examined three of the specimens now in the National Museum, remarks that "an examination of the specimens [of E. chelonicephalus?] in British Museum shows that a certain slight enlargement of the vertebrals is present at some spots, but no specimen has four prefrontals." should be mentioned, however, that in a specimen recently received by British Museum from Mr. Owston (No. 1903.6.29.23) as collected in the Yaeyama Islands, the two outer prefrontals are fused with the inner ones, and that Doctor Wall has since recorded another with similarly fused prefrontals.

Description.—Adult female; Science College Museum, Tokyo, No. 1; Riu Kiu Seas; 1888; Tashiro, collector (figs. 334-337). Head short; body rather short and stout; rostral broader than high, pentagonal, the labial border with a posterior projection which fits into the mental groove; nasals as long as frontal, twice as long as suture between prefrontal, and wider than long, in contact on median line and with very large semilunar nostrils situated on top near posterior border, the concavity directed forward; two pairs of prefrontals, the median pair large, pentagonal, in contact with nasals, frontals, supraocular and outer prefrontals which are small and nearly square and in contact with median prefrontals, nasals, preocular, and supraocular; frontal rather small, hexagonal, about as broad as long; supraoculars similar, but slightly longer; parietals rather large, about as

a One of our specimens of *E. ijima*, U.S.N.M. No. 33942, has also a very pointed conical tubercle on the rostral as well as numerous other pointed asperities or tubercles on the anterior facial shields. Another (No. 33943) has tubercles on other head shields, though the one on the rostral is not so prominent and pointed as in the other. Both of these specimens are males. The third is a female with entirely smooth shields. This character then seems to be sexual and not specific.

broad as long; one preocular, pentagonal; two postoculars, the upper largest, followed by two similar, but slightly larger, temporals; three supralabials, only the first and last being of normal size, the second forming a large plate corresponding to at least four ordinary supralabials, and bordering the eye below; mental deeply notched in front and divided by a deep median groove, followed behind by a pair of narrow shields which do not reach the commissure; behind these a pair of large chin-shields in contact, followed by another pair separated by an unpaired shield slightly smaller; three lower labials, on right side, four on left, first and third (and fourth) quite small, second forming a large plate corresponding to the second supralabial; dorsal



Figs. 334-337. Emplocephalus lime. Nat size. 334, top of head; 335, mde of head; 336, underside of head, 337, scutellation at middle of body. No. 1, Sci. Coll. Tokyo.

scales large, strongly imbricate, 15 rows around neck, 17 around middle of body, subequal, except median row which on four-fifths of the body and tail is greatly enlarged. the others, hexagonal and gastrostege-like; the secunder the magnifying glass show a few slight tub ventrals 140, wide with a rounded median keel i. anal large, regular, divided; subcaudals, 23, un of tail with four scale rows on each side between the and below, the terminal half with three such rows; rounded shield, irregularly frayed along the edges.

of a rich dark chestnut with narrow, bright ochraceous yellow cross-bands round the entire body, one to two scales wide on the back and two to three scales on the sides, and about four scales distant; a similar yellow band from angle of mouth through anterior temporals, upper postocular, outer half of supraocular to median prefrontals; a few irregular yellowish marks on second supralabial and on throat.

Dimensions.

	196198.
Total length	890
Snout to vent	
Vent to tip of tail	112

Variation.—A young specimen (U.S.N.M. No. 36517), ready to be born and taken from the abdomen of the above described specimen, is a perfect counterfeit of the old snake differing only in the following particulars: (1) It has 17 scale rows around the neck as well as around the middle of the body; (2) the mental is large, nearly heart-shaped, with a deep median groove, and the pair of narrow shields between the mental and the first pair of chin-shields is wanting. In other respects, notably the size and shape of the head-shields, the remarkable consolidation of the labials in both jaws, in the great width of the median dorsal scale row as well as in color, the two specimens agree completely. Enough of another young, still attached to the mother was freed from the egg membranes to ascertain that these points are equally developed in this specimen.

A fourth specimen is the male from Botel Tobago, mentioned by me when first describing the species. Although about a third smaller than the mature female described above, it appears to be adult, and agrees in almost every particular with that specimen. The only point of difference is that the rostral has a slightly elevated point, somewhat indicative of the spine in E. chelonicephalus. This character seems to be confined to the male sex. The specimen in question has 17 scale rows; 142 ventrals; a double anal; and 28 undivided subcaudals. Total length 613 mm.; tail, 93 mm. The fact that this specimen, as well as the three others in the National Museum, agrees with the adult female in having a pair of narrow shields immediately behind the small grooved mental and before the first pair of regular chin-shields, proves that the condition in the young specimens in which these pseudo-chin-shields are fused with the mental is an individual aberration only.

These "postmentals" or "pseudo-chin-shields," however, seem to be the first pair of sublabials which have been crowded away from the lip. The posterior lower projection of the rostral fits snugly into the anterior notch and groove of the mental and closes the mouth effectively.

The number of scale rows varies between 17 and 19, though the former seems to be the normal number; ventrals between 134 and 143, subcaudals between 23 and 28.

A specimen in British Museum, as previously mentioned (p. 414), has the outer prefrontals fused with the inner ones.

Since the above was written Doctor Wall has reported upon six examples obtained by Mr. Owston's collectors in Okinawa. Four had a sharp spine on the rostral, which was absent on the other two. The prefrontals were very irregular. There were four in three specimens, two in one specimen, and three (2 right, 1 left) in two specimens. In all one or both parietals were split by a suture behind. The scales were 17 in mid-body when the vertebral row was enlarged, which was usually the case, though often to a variable degree. In two specimens the scales were 19, the vertebrals being divided into three rows subequal to the other dorsals. Ventrals numbered 138 to 143.

Habitat. -This species is only known from the "Riu Kiu Sea," where Tashiro collected the gravid female in 1888, and from Botel Tobago Island, east of the south end of Formosa. A specimen was caught there on the rocks at ebb tide by Mr. Tsunasuke Tada, May 1897. Three specimens obtained by Mr. A. Owston's collector, on Ishigaki Island of the Yaeyama group, during the month of May, 1899, are now in the United States National Museum, and two are in British Museum, one from Yaeyama Island and one from Iriomote. Doctor Wall now records six specimens from Okinawa.

List of specimens of Emydocephalics tjenie

	Museum	No	Sex and age	1-ocality	When collected	By whom collected or from whom roceived	Scale rows	\ entrals	Attas	Subcandels.
			- 1		1899					
1	SNM	334942	Mase	Yacvama Islands	Apr Mas	A Owstor	10-	130	45	28
	Do	30043	do	dn	do	du	-17.	138	2	28
	110	33944	Female	dn	do	do	17	140	2	24
	Do	38517	1 ounge	Rin Kin Seas	, spec	Tashiro	17	,3A	2 .	
s	er Coll		Females	do	1585.	1888.	17	139	2	23
	Tokyo		* * * * * * * * * * * * * * * * * * * *	-44		******	- "	a sere	1	
	# sempse				1897					
	Dn	16	Male	Hotel Tobago Island	May	1 Tada	17	142	2	28
18	rit Mus	1901 10 23.8	do	Iriomote shima		Doctor Wall	18	136	2	27
	Do	1903. H 29, 23	Female 1	Yaeyama Island		A Owaton	19	134	2	
		1				1				
		a Type p	. 416	6 Desc	eription, p. 4	114, figs. 334-337				

26485- No. 58-07 -27

Genus DISTEIRA " Lacépède.

- 1803. Hydrophis Daudin, Hist. Nat. Rept., VII, p. 372 (part; not of Latreille, 1802).
- 1804. Distera Lacépède, Ann. Mus. d'Hist. Nat., Paris, IV, p. 210 (type, D. doliata).
- 1804. Leioselasma Lacépède, Ann. Mus. d'Hist. Nat., Paris, IV, p. 210 (type, L. striata).
- 1830. Enhydris Wagler, Nat. Syst. Amph., p. 166 (type, Hydrophis cyanocinctus) (not of Latreille, 1802).
- 1834. Microcephalophis Lesson, in Bélanger's Voy. Indes Orient., Rept. (p. 320); Atlas, Rept., pl. 111 (type, M. gracilis).
- 1842. Liopala Gray, Zool. Misc., p. 60 (type, Hydrus gracilis Shaw).
- 1842. Liopola Gray, Zool. Misc., p. 60 (err. typogr.).
- 1842. Aturia Gray, Zool. Misc., p. 61 (type, A. ornata).
- 1848. Noterophis GISTEL, Naturg. Thierr., p. 1x (substitute for Enhydris Wagler).
- 1849. Chitulia Gray, Cat. Sn. Brit. Mus., p. 56 (type. Ch. mornata).
- 1849. Kerilia Gray, Cat. Sn. Brit. Mus., p. 57 (type, K. jerdonii).
- 1852. Thalassophis Schmidt, Abh. Naturw. Ver. Hamburg, II, Pt. 2, p. 75 (substitute for Hydrophis Daudin).
- 1887. Distira Cope, Bull. U. S. Nat. Mus. No. 32, p. 61 (emendation).

The large central group of Hydrid snakes, about 40 species, has been gathered into two genera by Boulenger according to whether the maxillary teeth following the first pair of poison fangs are grooved (Disteira) or "solid" (Microcephalophis = Hydrophis Daudin, 1803, not Latreille, 1802). Recently some doubt has been thrown on the validity of this separation, inasmuch as Mr. West, in a typical Disteira, viz, D. cyanocincta, found that "the first two or three only of these teeth showed any indications of a groove." b

Relying, however, on the division established by Boulenger, I identified some of my specimens in which no grooved teeth were observable under a magnification of 10 diameters, as Microcephalophis melanocephalus. Three years later some similar snakes came under my notice, which, investigated by the same means, showed distinct grooves in the maxillary teeth, and as their other characters did not correspond to those of any other Disteira, I described them as a new species, D. orientalis.d While preparing detailed descriptions for the present work, however, I was forcibly struck by the fact that in all external characters the two species were absolutely identical. West's experience with D. cyanocincta and other parallel cases with various opisthoglyph snakes then occurred to me. The specimens at my command were consequently subjected to much greater magnifications, with the result that I find all the teeth grooved in all the specimens examined by me. To see the groove plainly it was often

[&]quot; From δις, double; στείρα, keel.

b Proc. Zool. Soc. London, 1895, p. 823, pl. xlvi, fig. 8.

c Journ, Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 224.

d Proc. Biol. Soc. Washington, XIV, 1901, p. 191.

necessary to use a binocular microscope magnifying 45 diameters, and to make sure of the presence of grooves on the anterior face of the maxillary teeth of *Disteira gracilis* it was even necessary to raise the power to 65 diameters. From my experience it is then plain that there is no real difference between the "grooved" and the "solid" maxillary teeth in these snakes, that it is merely a question of degree.

Under these circumstances there seems to be no other course than to unite the two supposed genera (and species!), the name Disteira being available for the thus consolidated genus. The term Hydrophis must disappear from our nomenclature, as Latreille, in 1802, framed it as a substitute pure and simple for Hydrus, while Daudin, in 1803, substituting Pelamis for the latter reemployed the former for the bulk of the Hydrid snakes.

Within the enlarged genus the limits and characters of the species offer some of the most difficult problems to the ophiologist. These snakes, in many respects so excessively specialized, often show a correspondingly excessive amount of individual variation, and as the series available for study is insignificant except in the case of a few species the result must of course be in great doubt.

If, for instance, we take the latest monographic account of these snakes, namely, Boulenger's treatment of them in the Catalogue of the Snakes in British Museum, by far the ablest treatise on the genus, based upon the largest material in any collection, we find that of 22 species recognized by him in the genus Hydrophis he had 77 specimens, or an average of 3.5 specimens to each species.^a If we analyze this material for the variability of the number of ventrals we come to the result that the range of the ventrals, that is, the difference between the greatest and smallest number of ventrals of the specimens of each species in British Museum is greater in proportion as the series of specimens examined increases. This is startlingly shown in the following table:

Number of specimens to British Museum	Range of ventrals	Name of species	Non serof specierus in fritish Museum	Range of ventrals.	Name of species.
11	47 26	fasisalys absorber	4	40	Coronaine
10	74	process	а	35	elegans
8	24	extulencens	2	36.5	mamillaris
5	42.5	torquatus			cantoris

The only exception is the series of eight *H circuloscens* in y the range of variability of the ventrals is unusually low. These mens however, cover a relatively small geographic range.

a In no instance did he have more than five specimens from one locality

The 27 specimens of *D. melanocephala* examined by me are practically from the same locality, and so is the Miyakoshima specimen recorded by Boettger. Even the type of the species collected by Sir. E. Belcher may well have been picked up at the same island. In these 29 specimens the range of the ventrals only amounts to 56, while in the 13 specimens enumerated by Boulenger as *H. fasciatus* it amounts to 147. His 13 specimens, however, cover a range from Malabar to China. If we eliminate the two types of Guenther's *Hydrophis atriceps*, with 364 and 353 ventrals, respectively, which I am inclined to refer to *D. melanocephala*, the variation in the ventrals is reduced to only 98.

The rational explanation seems to be that the individual variation in a fairly large series from the same locality is within reasonable bounds, and that the so-called "species" must be broken up on different lines from those which have been established by Boulenger.

This question is particularly important to us in the present connection, as some of the species which are reported from the waters adjacent to the region here treated of are very closely related, their differences consisting mostly in slight gaps between their scale formulas. The three species alluded to agree in having a very small head and a long body very slender anteriorly. As a rule they have a single large anterior temporal, and two pairs of small chin-shields in contact.

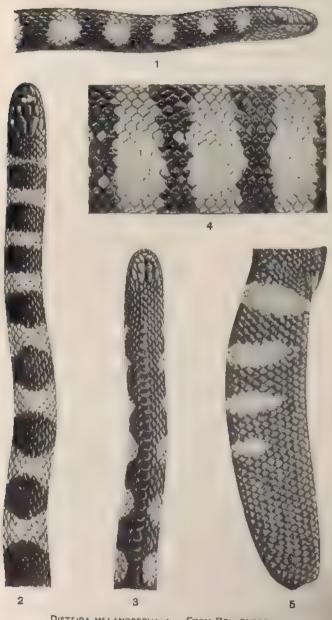
Carefully noting what is said in the following under the discussion of each species the various forms treated of may be distinguished by the following:

KEY TO THE SPECIES OF DISTEIRA IN CHINESE a AND JAPANESE WATERS.

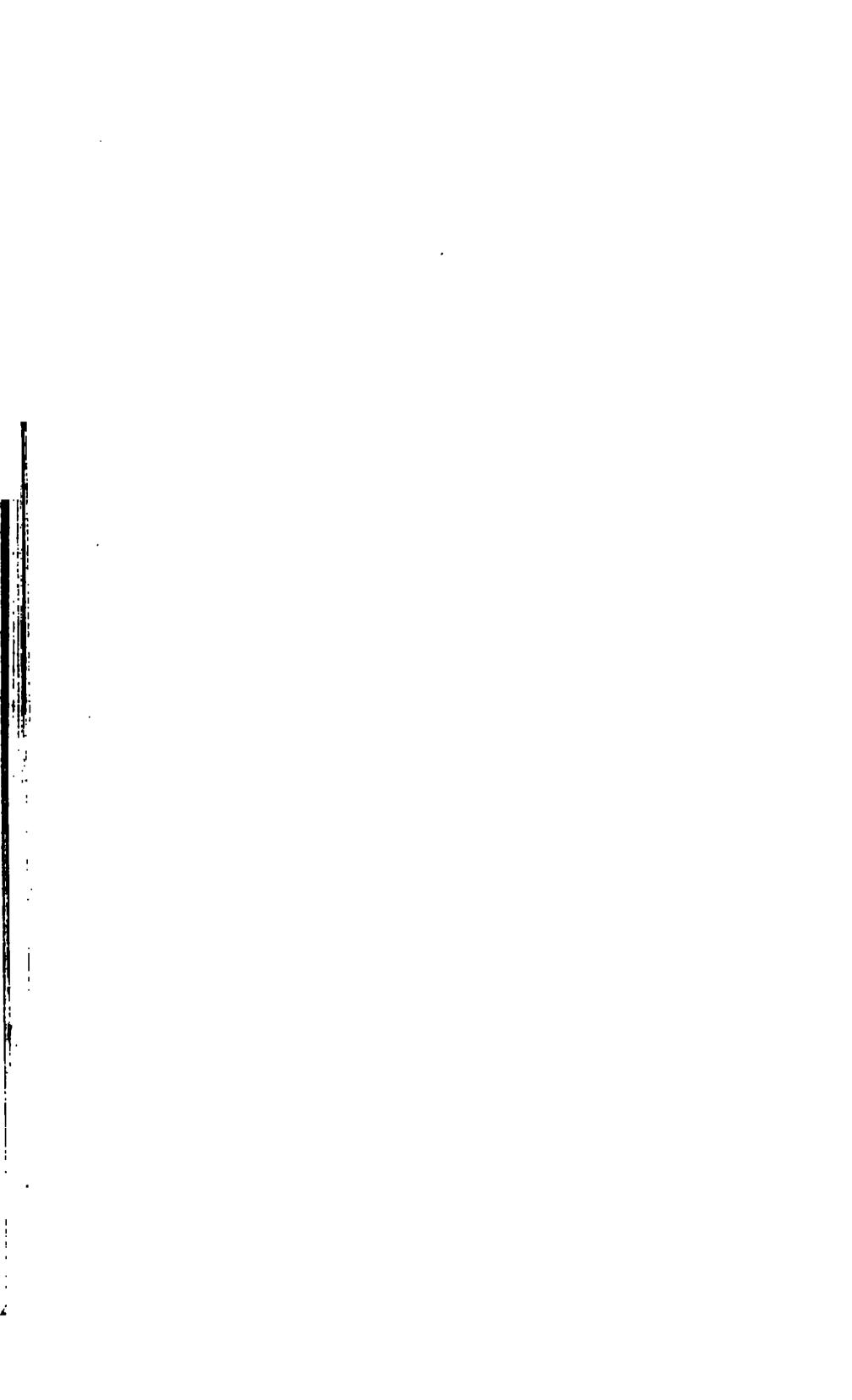
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a^1 Frontal shield longer than broad.
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- b^{1} Ventrals more than 295.
 - c^1 A single anterior temporal (normally).
 - d^{1} Scale rows around the neck more than 23 (25-33).
 - c^1 Scale rows around body 38, or less (38–32); ventrals less than 371 (301–370).
 - D. melanocephala, p. 421. c^2 Scale rows around body 40, or more (40-56); ventrals more than 399
 - (400-500)......[D. fasciata] p. 427.
 - d^2 Scale rows around neck less than 23 (19-21)[D. gracilis] p. 427.

- a The six snakes mentioned by Peters (Mon. Ber. Berlin Akad. Wiss., 1872, p. 859) under the name of Hydrophis diadema Guenther, from the coast of China and Siam (Berlin Mus. Nos. 4428-7428 and 4747) can scarcely belong to that species, if it is identical with D. obscura for which Boulenger gives the following scale formula: Scales around neck, 33-40; around body, 40-50; ventrals, 310-438. Peters's specimens have 31-33 neck scales, 37-40 body scales, and the one specimen of which the ventrals were given has 296. This scale formula does not agree with any of the zies as diagnosed by Boulenger.



DISTEIRA MELANOCEPHALA. FROM BOULENGER
FOR EXPLANATION OF PLATE SEE PAGE 555



DISTEIRA MELANOCEPHALA a (Gray).

Plate XXIII.

- 1849. Hydrophis sublavis, var. melanocephala Gray, Cat. Sn. Brit. Mus., p. 53 (part: type-locality, "Indian Ocean;" type in Brit. Mus.; Sir E. Belcher, collector).
- 1864 ? Hydrophis atriceps Guenther, Rept. Brit. India, p. 371, pl. xxv, figs. I-I¹ (type-locality, Siam; types in Brit. Mus.).
- 1895. Hydrophis fasciatus Boettger, Offenbach. Ver. Naturk. 33-36 Ber., 1895, p. 111 (Miyakoshima, Riu Kiu); Kat. Schl. Mus. Senckenberg., 1898, p. 113 (Miyakoshima) (not of Schneider).
- 1896. Hydrophis melanocephalus Boulenger, Cat. Sn. Brit. Mus., III, p. 283, pl. xv b (Indian Ocean; type).— Wall, Proc. Zool. Soc. London, 1903, pp. 95, 101 ("Loo Choos"); 1905, II, p. 516 (Ishigaki; Iriomote).— Microcephalophis melanocephalus Steineger, Journ. Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 224 (Pescadores Ils.).
- 1901. Disteira orientalis Steineger, Proc. Biol. Soc. Washington, XIV, Dec. 12, 1901, p. 191 (type-locality, Okinawa shima; type No. 29, Imper. Mus., Tokyo).
- 1903. Distira subcincta Wall, Proc. Zool. Soc. London, 1903, p. 95 (part: "Japan, Loo Choos;" not of Gray).

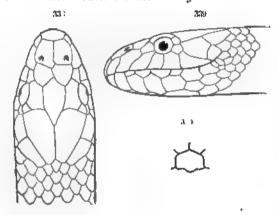
The line drawn between this and the following species, D. fasciata, viz, at the 370-399th scale rows, is possibly an arbitrary one, but I am inclined to believe that in this way we obtain better results and come nearer the truth. It is not certain, however, that other characters coincide with such a division, and possibly it might be better to separate the two forms according to the scale rows around the body, but the records are very defective on this point. On the other hand, there may even be three forms, one more or less confined to the coasts of India and the Bay of Bengal, with the maximum average of ventrals and body scales; another intermediate form from the Malay island world and adjacent coasts of the mainland, and a third, with a more eastern habitat, including the China Seas, having the minimum number of ventrals and scales.

^a From μέλας, black; κεφαλή, head.

Reproduced in this work on Plate XXIII.

^{**}There is a very serious obstacle to the defining of these forms from the records, viz, the difficulty in counting the scales and scutes of these snakes exactly. In the records we find the most divergent figures for the same specimens. Thus among the snakes included by Boulenger in this species, British Museum Nos. a, d, and c seem to be three of the four specimens mentioned by Guenther (Rept. Brit. India, p. 371) as II. lindsayi. These four he gives as having, respectively, 345, 390, 424, and 449 ventrals, while Boulenger's count is 402, 412, and 452. Guenther states that the number of ventrals of the type of his II. atriceps is 376; Boulenger counts 364. Guenther describes Gray's II. ocellata as having 296-334 ventrals, mentioning three specimens, one of these the type; according to Boulenger (p. 291), these three specimens (including the type) have 274, 275, and 290 ventrals; Guenther examined four II. ornata, among which the type and that of II. inornata and gives the ventrals of the species as 252-260; according to Boulenger the ventrals of the two types mentioned are 232 and 240.

The case would perhaps be less complicated if we knew all the darelating to the types of Guenther's II. atriceps. They seem to have sufficiently low number of ventrals to be included within D. melan cephala, but I can find no details relating to the number of scales roun the body. Guenther gives the number of scales around the neck as a and 28, respectively, consequently well within the limits of D. melan cephala, and I have consequently referred them, provisionally at less to the latter rather than to D. fasciata.



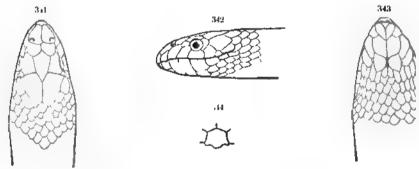
Figs. 238–340.—Distrira melanogephala. $2 \times$ nat size. 338, top of brad: 339, side of brad: 340, rostral. No. 4. Sci. Coll. Tokyo.

Boettger's II. fascitus, from "Miyakosh ma," with 27 scalround the neck, ; round the body, and 38 ventrals, is clearly ide tical with the twent one specimens from the same locality now be fore me.

With regard to n Disteira oriental which was based up specimens with post rior maxillary tee plainly showing groov

under a low magnification, and consequently believed then to belo to a different genus, see remarks above under the genus (p. 418).

Description (figs. 338-347). Adult female; U.S.N.M. No. 3394 Ishigaki shima, Yaeyama group, Riu Kiu archipelago: April-Mε



Figs, 341-344. Distriba melanocephala - 2. nat size - 341, for of head - 3,2 side of H - 343 endersid - of head - 23 × nat size. - 344, rostbal. No. A40. High School, Kumamor

1899; A. Owston collection. Rostral much wider than high, we visible from above; nasals very long, the suture between them twice long as that between the prefrontals; the emicircular valvular noscituated near the outer posterior corner of the nasal: frontal hex

onal, slightly longer than its distance from rostral, shorter than parietals, half as wide as long, wider than supraoculars; parietals as long as frontal and prefrontals together; no loreal, one preocular; one postocular; one large anterior temporal; 7 supralabials, second in contact with prefrontal, third and fourth entering eye, sixth very small; 3 lower labials in contact with anterior chin-shields; posterior chin-shields nearly as large as anterior, separated by a small scale, 25 rows

of smooth, imbricate scales round the neck, 35 roweround the middle of the body, the scales on the body being imbricate and provided with a short keel which reaches neither base nor tip of scale; about 340 ventrals which often are so reduced as to be distinguished with difficulty from



FIGS 345-347. DISTRIBA MELANOCEPHALA. NAT SIZE. 345, TOP OF HEAD 346, SIDE OF HEAD, 347, UNDERSIDE OF HEAD No. 14, IMPER. MUS. TORYO.

the scales, each ventral with two incomplete keels; anal divided, with an elongated smaller shield on each side; 40 subcaudals, terminal scale of tail small, only differentiated on one side. Color (in alcohol) above cinereous, white below, with 50 blackish rings round the body and 5 on the tail; head black with superciliary region and snout irregularly pale, the posterior supralabials being likewise light colored with a brownish tinge.

Dimensions

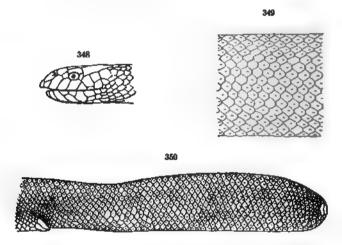
Hear very small, neek and anterior part of body very slender, increasing in thickness backward, the greatest height of the body being nearly 1 times the diameter of the neck

	795 771
Total length,	1 125
Snout to vent,	1, 027
Vent to tip of tail	98
Width of head	15
Diameter of neck	11
Greatest height of body	42
Grentest height of tail	26

The male is relatively much slenderer posteriorly.

Adult male: Imperial Museum, Ueno Park, Tokyo, No. 29; Okinawa shima, Riu Kiu Archipelago (figs. 348-350). Rostral nearly as high as broad, somewhat projecting, the portion visible from above longer than interprefrontal suture; nasals long, the suture between them twice as long as the one between the prefrontals, nostrils solunar close to the outer posterior angle; frontal long and nar length equaling distance from tip of snout and length of par width at the middle equaling that of the supraoculars; parie

the suture between them slightly longer than internasal suture; no loreal; one preocular; one postocular; one anterior temporal; 7 supralabials, sixth smallest, second largest, broadly in contact with prefrontal third and fourth entering eye; 3 lower labials in contact with anterior chin-shields which are somewhat shorter than the posterior, the latter broadly in contact anteriorly; 25 rows of smooth scales on the neck, 33 shortly keeled or tuberculated ones on the middle of body; 323 bicarinate ventrals, often scarcely differentiated; 4 subequal, elongate anals in a line: 43 subcaudals; terminal scales of tail



Figs. 348–359. Distriba melanocephala. Nat size. 349, side of head, 349, scutellation at middle of body ($\frac{1}{4} \times$ nat size), 350, side of tail. No. 2), Imper. Mus. Tokto.

but slightly differentiated. Color (in alcohol) very pale yellow, more ochraceous on back, with 50 blackish rings on back, six on tail, wider on the back and belly and confluent on the anterior third of the latter into a black ventral band, the dark rings narrower than the pale interspaces; head blackish with an irregular yellow spot on most of the shields, except posterior supralabials; lower labials, chin, and throat blackish; tip of tail black.

Dimensions

Head small, neck and body slender, especially anteriorly	T.	172 794 .
Total length		1, 080
Snout to vent		985
Vent to tip of tail		95
Width of head		8
Diameter of neck		7
Greatest height of body		27
Greatest height of tail.		21

The young resemble the adults except that the black color is more extended, so that the coloration of the snake may be described as

black with narrow whitish rings which are mostly interrupted on the underside, the whole lower neck and a more or less complete longitudinal band on the ventrals being black; head entirely black with a whitish postocular band and a pale spot on each of the prefrontals; tail black with a few lateral, vertical, white bars or spots.

Variation. - The extreme specialization of these snakes is accompanied by a correspondingly great variability. Thus the reduced ventrals are so irregular and so often subdivided to the size of the adjacent scales that their number in a large series shows an excessive range, a feature alluded to above under the preliminary discussion of the species (p. 420). The head shields also show considerable variation, though to a less degree. The supralabials are 7, as a rule, but 8 are occasionally found, and 6 very seldom; three of them may enter the eye; two postoculars occur, but one is the normal number; posterior chin-shields in contact as a rule, but occasionally separated by a scale. The most notable variation, however, is the occasional, though rare, presence of two anterior temporals, because the scale formula of such specimens reads like that of D, cyanocineta, in which two anterior temporals is the rule. The arrangement, however, is different, for while in the former the two anterior temporals are produced by the horizontal division of the larger temporal located above the very small sixth supralabial, in the latter it is caused by the horizontal division of the fifth supralabial. In the former case we have the very small sixth supralabial between the much larger fifth and seventh, while in the latter the three are subequal or the sixth intermediate in size between the other two.

In the Pescadores Island specimens the small sixth supralabial on the left side is abnormally fused with the fifth, as shown in fig. 339, but on the other side it is normal.

Habitat.—The locality whence came the type of this species is given as "Indian Ocean," but as it is one of specimens brought home by Sir E. Belcher, this probably means only that it was obtained during his cruises in the "Samarang" in which case it is just as likely to have been collected in the China Sea or even in the waters about the Riu Kius, where it is evidently a common snake, as I have examined 24 specimens from the southern group (Saki shima), one from Okinawa, and one from the Pescadores in the Formosa Channel. Here also belongs the II. fasciatus recorded by Boettger from "Miyakoshima," Finally there is the specimen in the den (No. 1483). It is labeled "Hydrop Japan." However, it is not the specime in Fauna Japonica (Ophid., pl. vii), but referred to in the text (p. 89) as "harpo 27^{mo} degré de lat. bor." apparently the

von Siebold.^c It would therefore almost appear as if this species were confined to the neighborhood of the Riu Kiu Islands.

List of specimens of Distern melanocephala.

		13101 (1)	apecenteria of 2	THUE CITE IN CE	иноскриши,						
Museum.	No	Sex and age	Incality.	When collected	By whom col- lected or from whom received	Beale rows on neck.	Scale rows on body.	Ventrals.	Subcaudals.	Supralahlala.	Anterior temperals,
				1899.							
U.S.N M.	33945	Femules	lebigaki shima. Riuku	Apr May	A Owston	25	35	340	40	7	
Do	.1 33946	Male.	du,	do .	do	27	35	323	35	7	
Do			do '	do	do	25	35	318	48	7	
Do				do		27	37	328	421	7	
Do	33949	Male	do	do	do	27	33	314	42	7	
Do	33950	do	do	do	do	25	35	315	44	7-8	
Do	33951	Female.	do	,do,	do	31	35	322	43	7-8	
Do	33952	do	do	do	do	25	35	345	40	7	
Do	33953	Male	do	ldo	do	27	35	313	40		
Do	33954	Female	do	.do	. ,do,	201	35	345	30	7	
Do	33955	Young	do	đo	. do	25	33	336	43	7-8	
Do	33966	,do,	do,	do	do	27	33	331	44	7-6	
Do	33967	do	do.,	do	da	25,	35,	327	42	7	
Do	33958	do	do	do	do	25	35	339	44	7-8	
Do	33969	Male	do	. do	do	25	35.	387	45	8	
Do ,	33960	Female	do. ,	. do	.do .	27	35	311	35,	7	
Do	33961	Male.	da	do,	do	25	35	317	47	7	
Do	33962	Female	do	, do ,	do .	27	33	356	37	6-7	
Do	33963	Mule	do	do	do .	27	35	353.	491	8,	
Kumsunoto , ,	A 40	Young b	do	1891		27	33	324	42	**	
Banckenberg.,		(4)	Miyakoshima		B Schmacker	27	38	355	53	7	
Brit. Mua,	a '	Femaled	"Indian Degan"	1897	Str F. Belcher	25	35	329			
Do	b	,do *	Triomote shime.		Doctor Wall	25	32	321			
Bet Coll.	4	Male /	Pescadores 1s-	Feb. ,	T Tada	27	37	301	49	8	
Tokyo.			landa.						1		
lmp. Mus.,	14	Female v	Miyakoshima .			27	35	330	39	7	1
Tokyo.							- 1		1		
Do	29	Male	Okinawa shima			25	33	323	43	7	
			Ria Kiu						- 1		
				1807					- 1		
Hamburg	2574a		Priomote shiina	Mar 13	Lenz	23	34	- '			
			Rlu Kiu					i			'
Do	25746		do	do	10	24	32				
læiden,	1483	• • •	"Japan"		von Siebold	25	35	341	51		
	ĺ							,	- '		ļ
a Descript		429	d Type.		# Figs. 345-347.						
6 Figs. 341		ı	Boutenger, MS	, cat	h Type of D or			Dea	ertpi	ion,	,
 Boettge 	r, p. 111	l	/ Figs. 338-340.		p. 423. figs. 3	15-44	у.				

[&]quot;The specimen in question (No. 1483) was examined by me in 1898; for the permission to do so thanks are due to the director. Doctor Jentink. It was labeled as stated above, and the count of ventrals and subcaudals gave respectively 341 and 51 scutes. These figures, however, agree only with the third specimen mentioned by Schlegel (Phys. Serp., II, p. 504), who states that this is the one collected by Buerger. Whatever error may have crept in, there can be but little doubt that the specimen we collected practically in the same waters as the others.

[DISTEIRA FASCIATA " (Schneider).]

- 1799 Hydrox fasciatos Scharider Hist Anaph I p 240 (type-locality, unknown; types in Beilin Mus. Nos. 2836–2837 Distora fasciato Fitzis Ger. None Class. Rept. 1826, p. 55. India. Hydrophis fasciatos Prenas. Mon. Ber. Berlin Akad. Wiss., 1872. p. 849. pl. 1, fig. 1 (types, description). Boulevaler, Cat. Snakes Brit. Mus., III, 1896, p. 281, coasts of India to China and New Guinca).
- 1837 Hydrophis graedis Scherel, Phys Serp., H. p. 507 part; Padang, Samatra not Hydrus graedis Shaw, 1802). Jan. Heon. Opliid , hvr. 41, 1872 pl. iv. tig. 2 (Java)
- 1842. Atura lindsap Gray, Zool Misc (p. 61) (type-locality, China; type in Brit. Mus., W. Landsay, coll
- 1864 Hydrophis chlorus (it ENTHER, Rept. Brit. India, p. 370 (not H. clorus DAUDIN, 1803) Madras Pinang).

For the characters supposed to separate this species see the "key" (p. 420) and the discussion under the foregoing species (p. 421). In view of the statements there made a detailed description is deemed superfluous.

Habitat. -Boettger has recorded Hydrophis fasciatus from Miyakoshima, but I have given my reasons elsewhere (p. 422) for referring this specimen to D. melanocephala. Under these circumstances this species has no standing in the Japanese fauna, but I have included its synonymy here because of the uncertainty of the status of this and allied forms.

As generally understood, D. fasciata has a wide distribution from the coasts of India to the Philippines.

[DISTEIRA GRACILIS & (Shaw).]

- 1802. Hydras graculis Shaw, Gen Zool., 111, Pt. 2, p. 560 (type-locality not given).

 District graculis Fuzzinoru, Neue Classif Rept. 1826. p. 55 (India).

 Microcephalophis graculis Lesson, in Bélanger's Voy. Ind. Orient., Rept. (p. 321), Atlas, Rept., 1834, pl. in (Bay of Bengal). Hydrophis gracilis Guenther. Rept. Brit. India, 1864, p. 373. Madras. Boulenger, Cat. Sn. Brit. Mus., 111–1896, p. 280 (Persa. to Malay Archipelago). Hydrophis. Microcephalophis. graculis. Boettger, Offenbach. Ver. Naturk., 26–28 Bet., 1888, p. 90 (Haman.)
- 1827 Hydrophockadell magam Bore, Isis, 1827, p. 554 , based on Russell's Ind. Serp., 11, pl. xm;
- 1852 Thalassophus anterocrephala Schmitt, Abh. Naturw. Ver. Hamburg, H. Pt. 2, 1852, p. 78. pl. it. (ypo-locality Java: typesin Hamburg Mus.) Hydrophis microcrephalus Demisire and Bibron. Erpét. Gén., VII., Pt. 2, 1854, p. 1356. (Pondichéry Hydrophis microcrephala Eisenburg, Abh. Naturw. Ver. Hamburg. 111–1856, p. 52. Java.)

1856 Hydrophis leproquiste Di Merit and Bibnos, in Fischer Abh, Naturw. Ver. Hainburg III 1856 to 5 series pholo, type-locality, Pondichery type:

The differentiating cl proportion and scale fo ly those of 'ssary in the present connection. The essential points may be gathered from the "key" (p. 420).

Habitat. -The slender sea snake has a wide distribution from the Gulf of Omar, between Arabia and Persia, to the Malay Archipelego and the South China Sea.

It has been recorded as far north as the island of Hainanand Macao, but not yet from Japanese waters. It is included here, have ever, to help identification in case its range extends that far.

DISTEIRA CYANOCINCTA " (Daudin).

- 1803. Hydrophis cyanocinctus Daudin, Hist. Nat. Rept., VII, p. 383 (type-locality, Bengal; based on Russell's Ind. Serp., II, pl. 1x).—Boettoer, Offenbach. Ver. Naturk. 26-28 Ber., 1888, p. 88 (Hainan).—Hydrophis cyanocincta Hilgendorff, Mitth. Deutsch. Ges. Ost-Asiens, I, heft 10, July. 1876, p. 31.—Distira cyanocincta Boulenger, Fauna Brit. India, Rept., 1890, p. 410; Cat. Sn. Brit. Mus., III, 1896, p. 294 (Persian Gulf to Japan; Formosa).—West, Proc. Zool. Soc. Lond., 1895, p. 823, pl. Lxvi, figs. 1, 8, 17 (poison gland; maxilla).—Wall, Proc. Zool. Soc. London, 1903, pp. 96, 101 (Hongkong).
- 1804. Leioselasma striata Lacépède, Ann. Mus. d'Hist. Nat., Paris, IV, p. 210, pl. Lvii, fig. 1 (type-locality, "Nouvelle Hollande").—Hydrophis striata Schlegel, Phys. Serp., II, 1837, p. 502, pl. xviii, figs. 4-5 (Japan Seas); Fauna Japon., Rept., 1837, p. 89 (part), Oph. et Saur., pl. vii (Japan Seas).—Okada, Cat. Vert. Japan, 1891, p. 69 (Okinawa Sea).
- 1817. Hydrophis chittal RAFINESQUE, Amer. Month. Mag., I, p. 432 (India; based on Russell).
- 1849. Hydrophis subannulata Gray, Cat. Sn. Brit. Mus., p. 54 (type-locality, India).
- 1849. Hydrophis aspera Gray, Cat. Sn. Brit. Mus., p. 55 (type-locality, Singapore; type in Brit. Mus.).
- 1859. Hydrophis westermani Jan, Rev. Mag. Zool., 1859, p. —; author's separate, p. 26, pl. E (type-locality, Indian Ocean; type in Mus. Milano).
- 1863. Hydrophis westermanni Jan, Elenco Sist. Ofid., p. 111 (emendation); Icon. Ophid., livr. 39, 1872, pl. v. fig. 1 (type).
- 1870. Hydrophis trachyceps Theobald, Cat. Rept. (p. 70).
- 1871. Hydrophis crassicollis Anderson, Journ. Asiat. Soc. Bengal, XI., 1871, (p. 19).
- 1887. Hydrophis taprobanica HALY, Taprobanian, II, (p. 107).
- 1887. Hydrophis phipsoni Murray, Journ. Bombay Nat. Hist. Soc., II, (p. 32, pl.).

Description.—Adult female; U.S.N.M. No. 33931; Inatori, Idzu, Hondo, Japan; December 22, 1903; A. Owston collection (fig. 351). Rostral nearly as high as broad, the portion visible from above about as long as interprefrontal suture; nasals large, the suture between them twice as long as that between prefrontals; nostril in outer posterior corner of nasal; prefrontals not larger than supraoculars with which they are broadly in contact; frontal long, longer than its

distance from rostral, but shorter than that from tip of snout, slightly broader than supraoculars; parietals longer than frontal, the interparietal suture equaling the distance of frontal from rostral; no loreal; one preocular; eye small, not larger than preocular; two postoculars; two anterior oblique temporals, the lower one being the upper cut-off portion of fifth (sixth on right side) supralabial; 7

supralabials on left side, 8 on right, second largest, fifth, sixth, and seventh (sixth, seventh, and eighth on right side), very low, subequal, third and fourth (third and fifth on right side, the interpolated fourth not reaching the orbit) entering eye; 3 lower labials in contact with anterior chin-shields which equal the posterior pair, the latter in

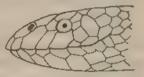


FIG 351 DISTRIBA CLANDEINCTA, 1½ X TIMES NAT SIRE SIDE VIEW OF HEAD, NO. 33931, U.S.N.M.

contact throughout; 33 rows of scales on neck, 41 on middle of body, the latter with a bituberculate keel; 329 ventrals which are nearly smooth; four elongate, subequal anals; 38 subcaudals; tip of tail with a slightly enlarged scale. Color (in alcohol) pale yellowish, back suffused with gray, the skin between scales black; 53 dark gray crossbands, broadest and darkest, nearly black, on back, 5 on tail; top of head olive gray fading into a paler tint on labials and throat.

Dimensions

Head small neck fully as wide body very elongate its greatest height not far from the vent, posteriorly considerably compressed

		20.09
Total length ,		1, 290
Shout to yent		1, 180
Vent to tip of tail		110
Width of head		14
Diameter of neck.		15
Greatest height of body		46
Greatest height of fail	The second secon	24

The male is less elevated behind and the scales and ventrals strongly tuberculate.

Variation. -Of the head shields probably the supralabials are subject to the greatest variation, 7 being the normal, while the eighth may be interpolated at various points and thus make the formula appear more unstable than it really is. The arrangement of the anterior temporals is characteristic, the difference from that of D. melanocephala was pointed out under the latter species. The coloration is rather variable inasmuch as occasionally specimens having the upper surface uniformly dark without while on the other hand individuals having a the underside uniting the dark rings a

Habitat. = This is one of the most widof the sea snakes, extending as it does from in the Persian Gulf and Maskat in Arabia to Japan and, according to Peters, even to the Kingsmill Islands (Gilbert Archipelago) in the east.

Whether the specimen figured in Fauna Japonica (Plate VII) be the one collected by von Siebold or by Buerger (see p. 426 under *D. melanocephala*) there can be but little doubt that it was taken in Japanese or rather in Riu Kiuan waters. That it is rather common around Formosa seems proven by five specimens in British Museum collected by Swinhoe.

Stray specimens may occasionally drift far enough north to be taken in Japan proper as is shown by the specimen in the U. S. National Museum which was taken off Inatori, Idzu, on December 22, 1903.

Museum. No. Sex and age.	Locality.	When rot-	By whom col ² lected or from whom re- ceived.	Scale rows on neek. Toale rows on hedy	Ventrals.	Bupralebiale.	Anterior temporals.
.S.N.M 33931 Female		1903. 1 Dec. 22	A Owston	33 * 41	329	3 (TR	1
irit. Mus Ag _i Female	b Formera		B. Swinhoe		310		١.
Do Ah Young			. do		108		
Do., Af . do.b.	do		, do		305 .		
Do , Ak ., do.6	,do		, du		303	٠.'.	
Do. Ch Fomale	c' do		40		330		١.

DISTEIRA GODEFFROYI # (Peters).

1872. Hydrophia godefiroyi Реткия. Mon. Ber. Berlin Akad. Wiss., 1872, p. 856, pl. 1, fig. 3 (type-locality, Kingsmill Islands; types in Berlin Mus.).——Distira godefiroyi Boulenger, Cat. Snakes Brit. Mus., III, 1896, p. 291 (2 specimens Brit. Mus., loc. unknown).

1908. Distira ornata Wall., Proc. Zool. Soc. London, 1903, pp. 95, 101 ("Loo Choos") (not of Gray, 1842); 1905, II, p. 517 (Okinawa).

Four specimens from Ishigaki shima I refer to *D. godeffroyi* with considerable hesitation.^b They have the maxillary teeth following the poison fang distinctly grooved, and no doubt they are properly located among the species included by Boulenger in the genus *Disteira*. Doctor Wall, who examined them while yet in Mr. Owston's possession, identified them as *D. ornata* and recorded them under that name in

^a In honor of the German merchant, Johann Cesar Godeffroy (born in Kiel, July 1, 1813; died in Hamburg Feb. 9, 1885) who in 1861 founded the Museum Godeffroy. The museum which was finally dispersed after his death was devoted mostly to Polynesian zoology and anthropology.

b This hesitation does not refer to the specimens in British Museum from an unknown locality and named D godeffrom by Boulenger, but to the species as originally described by Peters from the Kingsmill Islands.

the Proceedings of the Zoological Society of London for 1903. They can not well be referred to that species because of the small number of scale rows, especially around the neck. Their scale formula agrees well with that of D. major, which seems to have the same distribution as D. ornata, but their rostral is much broader than high, as is the case in the latter and not as broad as high. They also agree in many respects with D cyanocincta, which occurs as far north as Formosa at least, but the maximum of their ventrals is 246, while the minimum of ventrals in the latter species is said to be 281, and, save in exceptional cases, above 300. In Boulenger's synopsis of the species, a D. cyanocincta on the one hand and D. ornata, major, and godeffroyi on the other are distinguished by the latter having the "second pair of chin-shields, if distinct, separated by several scales," while in the former they are said to be "in contact on the middle line" "or separated by a single scale," but evidently this distinction does not hold, at least not for the present species. Peters, in the original description of D. godeffron, expressly states that in the larger specimen of the types both pairs of chinshields are in contact, while in the smaller one the posterior pair is separated by two scales which are pointed anteriorly. In our four specimens scarcely two are exactly alike, though there can not be the faintest doubt that they all belong to the same species. One (No. 33934) has the two posterior chin-shields in contact; in two (Nos. 33933, 33935) they are separated by one, and to some extent also by a second scale, while in the fourth (No. 33936) they are separated by two scales exactly shaped as described by Peters.

The distance from the type locality, the Kingsmill, or Gilbert Islands, is certainly considerable, but so little has been collected in the intermediate region that no adverse argument can be derived

from the remoteness of the Riu Kiu Islands.

In one sense our specimens are intermediate between all the species mentioned. This has already been demonstrated with regard to the relations of the posterior chin-shields. In the number of scales around the neck (viz, 30-34) they assume a position between *D. cyanocincta*, with 27-33, and *D. ornata*, with 35-42. In scales around the body (33-43) they agree better with *D. cyanocincta* (39-43) than with *D. ornata* (40-50), while in the number of ventrals (227-246) they come within the limits of the latter (210-300) and not within the former (281-426). It is just possible that the case is similar to the one pointed out under *D. fasciata* and melanocephla (p. 421) and that the limits of the three species are not properly defined.

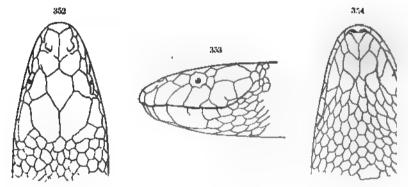
It may be that the distinction is not so much one of scale formula as of other characters. Thus, according to Boulenger, D. major,

[&]quot; Cat Sn Bert Mas III 1896, pp. 286-287.

b The type specimens of It godeth me are said to have 294 tively, consequently more than the exceptional minimum.

with which our species agrees best in scale formula, has the ro-"as deep as broad," and only one pair of chin-shields, while our the rostral much broader than high and the second pair of chin-sh well developed. In D. ornata this feature is apparently no marked, for Boulenger speaks of the "posterior chin-shields, if tinet, separated by two or three scales." In D. cyanogineta the ro is but "slightly broader than deep," and the scales "subimbricat while in our specimens the difference between breadth and dept the rostral is considerable and the scales can not be termed an bricate on the posterior part of the body at least. I do not b whether the size of the terminal scale of the tail is of any conseque Boulenger does not mention it in his descriptions, but in Jan's fig. which Boulenger cites under D. ornata it is quite large, while it specimens no such enlarged terminal scale is differentiated. expressly mentions that in D. godeffroyi the terminal tail scale small.

I may add that our specimens agree on the whole very well Peters's figures, except that the first supralabial is considerably h



Figs. 332-351. Dispers godeffrom $\Omega_{\rm L}$ Nat. 8628. 352, for of head 353, 8608. Of he underside of head. No. 3893, U.S.N.M.

than shown in his fig. 3. The anal shield, or scales (fig. 3d), exactly with the arrangement in our female (No. 33933), while i three males there are four rows of small scales between the lalarge scutes instead of two. This arrangement of the prestogether with the greater relative shortness of the body, seem be among the best characters of this species.

Description, -Adult female; U.S.N.M. No. 33933; Ishigaki gi Yaeyama group, Riu Kiu archipelago; April to May, 1899; A. Ot collection (figs 352-354). Rostral much broader than 'high, visible from above; nasals long, with the crescentic valvular n close to the posterior edge, internasal suture as long as interpa suture and three times as long as the one between the prefron

 [&]quot;Scales all imbricate" in key, Cat. Sn. Brit. Mus., 111, 1896. p. 287.
 Leon. Ophid., flyr. 40, pl. vi. fig. 1

frontal as long as its distance from rostral, once and a half as long as wide, shorter than parietals; parietals as long as frontal and interprefrontal suture together; no loreal; one preocular; two postoculars; 8 supraoculars, seventh and eighth very small and low, fifth a low triangular piece separated off from sixth, second in contact with prefrontal, very high and large, 3 lower labials in contact with anterior pair of chin-shields which are larger than posterior, the latter separated by two scales; 34 rows of slightly tuberculated scales on neck, 43 on middle of body, the tubercles on the latter more strongly developed; 246 bituberculated ventrals; preanal region covered with scales, four of which form the anterior edge of the vent, the outer ones on each side slightly longer than the others: 39 subcaudals; terminal scale of tail but slightly enlarged. Color (in alcohol) buffy white with a tinge of gray on the back and throat; 46 slaty-gray crossbars on neck and body and 8 on tail, broadest on middle of back, where broader than the light interspaces, gradually narrowing to the middle of the sides whence they extend as narrow, paler-colored bands to the abdomen, which many of them cross; head nearly uniformly isabella-colored; the last three bands on the tail blackish

Inmensions

Head rather large, neck thick, body short high, and very compressed

				mm
Total length				790
Snout to vent				690
Vent to tip of tail.		,	 	100
Width of head	 			19
Diameter of neck	 		 	19
Greatest height of body				51
Greatest height of fail				27

The males are much slenderer posteriorly, the greatest height of body being less than twice as high as the neck.

Variation. Under the preliminary discussion of this species (p. 431) reference is made to the variation of chin-shields and number of ventrals in this species. The supralabials are also subject to considerable variation, chiefly caused by the irregular breaking up of the posterior shields and the consequent uneven arrangement of the fragments edging the lip. This irregularity in the posterior supralabials also affects the adjacent temporals inasmuch as a shield becomes a labial or a temporal according to whether the low portion of it is cut off so entirely as to exclude the upper pofrom the edge of the lip, or not.

Habitat. The distribution of D. godeffroyi, as here understood curiously disconnected one, inasmuch as the only specimens refer to it are known from the Kingsmill Islands in Polynesia, and from

Ishigaki shima in the Riu Kiu Archipelago, while the other two in mens in British Museum have no locality attached to them

Wall now records three from Okinawa

List of specimens of Disterra godeffrom

U.S N M No	Sex	Locality	When col- lected	By whom etc. lected or from whom received.	Sente rows on neck Sente rows on hody.	t eutro.8.	Stibeaudala	Chample State
			1909					
33933	Female a	Ishig &H., Rin Kha	April-May	A Owston	34 43	246	39	7
33934	Male	10	.40	do	30 35	228	45	7
33935	do	do	ďΩ	do	32 53	235	44	
33936	do	do	do	.40	33 33	227	43	

a Description p 432, figs 352 354

[DISTEIRA VIPERINA # Schmidt .]

1852 Thalassophis viperina Schmitt, Abb Nature Ver Hamburg II, Pt. 2 pl. tit type-locality, Java, type in Hamburg Mus — Hydrophis (1 sophis viperinas Boettger, Offenbach Ver Naturk 26 28 Ber., p 91 (Haman — Distra reperina Bottenger, Fauna Br t India, 1 1890, p 413, Cat Sn Brit Mus 111, 1896 p 298 Maskat to 1 kongo — Boettger, Kat Schl Mus Senckenberg 1898, p 114 (Hailand Children Carpentella District Company 1898, p 114 (Hailand Carpentella District Carpentella Dist

1854 Disterra præsentata Di MERIL and BIBRON, Erpét Gén., VII., Pt. 2, p (type-locality unknown; type in Paris Mus

1856 Hydrophis doliata Fischer, Able Naturw Ver Hamburg, III, (Schundt's type of T. operana, not of Lacépède, 1804)

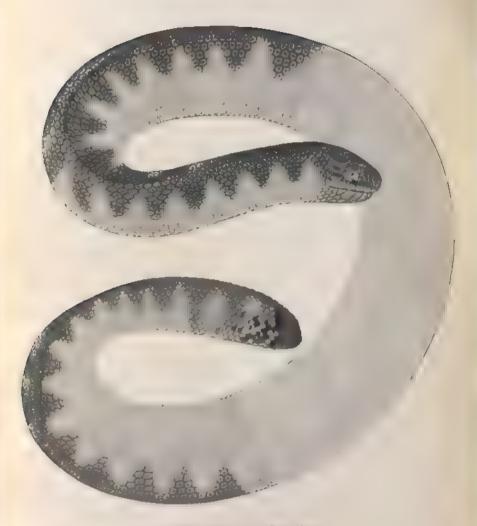
1887 Hydrophis jayakari Bot Lenger, Ann Mag Nat Hist 5, XX, p 408 locality, Maskat, Arabia, type in Brit Mus., Doctor Jayakar, coll 1887. Hydrophis plumbra Murray, Journ Bombay Nat Hist Soc., H 19.

No specimen of this species being at hand, I submit the diagricen by Boulenger in the Catalogue of Snakes.

Diagnosis. Head rather small; body moderately elongate, restender anteriorly; rostral as deep as broad; nasals as long as little shorter than the frontal; suture between the prefrontals short; frontal as broad as long, as long as its distance from rostral or end of the snout, shorter than the parietals; one or two and one or two postoculars; 7 or 8 upper labials, second large fourth or third and fourth entering the eye, one or two anterior porals; two pairs of chin-shields, in contact with each other, post longest; 27 to 29 scales round the neck, 37 to 43 round the bescales juxtaposed, obtusely keeled; ventrals relatively large terorly, bituberculate in the male, 235-267. Slaty gray above, rhomboidal transverse black spots, white or pink on the sides inferiorly; some specimens uniform dark gray above, in the yethe black spots are continued down the sides of the body; entail black.

U. S. NATIONAL MUSEUM

BULLETIN NO. 58 PL. XXIV



LAPEMIS HARDWICKII (FROM JAN)
FOR EXPLANATION OF PLATE SEE PAGE 555.



		Dimensions	
			271.176
Total length .			920
Snout to vent			820
Vent to tip of tail			100

Habitat.—Distributed from Arabia in the west to China in the east, though apparently rather rare

 British Museum has one specimen from Hongkong, and Herz collected one at Hainan, which is now in the Senckenberg Museum.

It has not yet been recorded from any locality within our territory, but it seems highly probable that it occurs around Formosa at least occasionally.

[Genus LAPEMIS Gray.]

1820 Enhydris MERREN, Syst Amph., p. 140 (part, not of Latreille, 1802).

1834. Lapenas Guay Bl. Ind. Zool. H. opl. (xxxxx), bg. 2) (type L. haidnicki).

1861. Pelangdoidis Firzisger Sitz Ber Akad Wiss Wien, Math-Nat Cl., XLJI, p. 409 (type, Hydrophis pelanidoidis Schlegel)

Apart from the fact that Merrem's Enhydris of 1820 is preoccupied by Latreille for an entirely different kind of snake, that name can not be used for a genus with Hydrus curtus for type, as restricted by Boulenger in 1890, because Wagler, as early as 1830, restricted it to H. cyanocinctus, one of the species included by Merrem in his Enhydris.

[LAPEMIS HARDWICKIIb Gray.]

Plate XXIV

1834. Lapemis hardwickii Gray, Ill. Ind. Zool., H. (pl. lexxxvii, fig. 2) type-locality. India type in Brit. Mus., Hardwicke, collector. Hydrophis hardwickii Glestifer, Rept. Brit. India, 1864, p. 380, pl. xxv., fig. w. (type-locality, Pinang). Mieller, Verl. Naturi Ges. Basel. VII, Pt. 1, 1882, p. 170. author's separate. p. 7) (China Sea). Enhydris hardwickii Bollesger, Fauna Brit. India, Rept. 1890, p. 397. Cat. Sn. Brit. Mus., 111, 1896, p. 301. Bay of Bengal to Chinese Sea and New Guinea).—Wall, Proc. Zool. Soc. London. 1903, p. 96. Manila. Bangkoko.

1837 Hydrophos pelanadoides Schleigel, Phys. Serp. I. p. 187. II, p. 512 (Bay of Rengal, and seas of China and of the Mediceus). Atlas. pl. xviii, figs. 16-17, Fauna Jap., Rept., 1837, p. 91, Ophid. pl. (x. seas south of Japan). Jax., Kon. Ophid., livr. 41, 1872. pl. ni, fig. 10. Indian Ocean. - Boetter, Offenbach. Ver. Naturk. 17, 18. Ber., 1878, p. 8. (Japan). Okada, Cat. Vert. Japan. 1891, p. 69. Okinawa Sea.

1843 Lupemes loreates Gray Ann Mag Nat Hist, XI ep. 46) (type-heality, Berneo, type in Brit. Mus., Belcher, collector

1856 Hydrophis Pelanas pelanadonles var. annaluta Fischen Abh. Naturw. Ver. Hamburg 111, p. 67, pl. miclava Hamburg Mus

1863 Hydrophia abbrevatur Jan, Elenco Sist, Ohd., p. 109, type-locality, Manda; type in Essex Inst., Salem, Mass., Icon. Ophid., hvr. 40, 1872, pl. rv, fig. 2

1863. Hydrophis becas Jan. Elenco Set. Ofid., p. 109 (type locality, Manda, type in Mus. Milano); Icon. Ophid., livr. 40, 1872, pl. v, fig. 2.

a Anagram of Pelamis.

b For Gen Thomas Hardwicke, who collected the type.

[·] Reproduced in this work on Plate XXIV.

- 1871. Hydrophis fayrcriana Anderson, Journ. Asiat. Soc. Bengal, XL, Pt. 2, 1871 (p. 19).
- 1876. Hydrophis pelamoides Hilgendorf, Mitth. Deutsch. Ges. Ost-Asiens, I, heft 10, p. 31 (lapsus).
- 1885. Hydrophis hardwicki Boettger, Offenbach. Ver. Naturk. 24-25 Ber., p. 155 (emendation).
- 1888. Hydrophis hardwickei Boettger, Offenbach. Ver. Naturk. 26-28 Ber., p. 150 (emendation).

Jan's Hydrophis problematicus (Rev. Mag. Zool., 1859, author's separate, p. 25) with 27 scale rows on the highest part of the body and 230 ventrals, can not well be this species. It is said to be from Manila.

There being no specimen from the waters adjacent to our territory available for description a modified copy of Boulenger's diagnosis in his Catalogue of Snakes is deemed sufficient for identification.

Diagnosis.—Rostral as deep as broad or slightly broader than deep; parietals large; one pre- and one to three postoculars; a loreal sometimes present; two or three superposed anterior temporals; 7 supralabials, fourth or third and fourth entering eye; chin-shields very small and separated by scales, or quite indistinct; 25 to 33 scales round the anterior part of the body, 34 to 37 round the middle, with tubercles [very feebly developed or a short keel]; ventrals usually very indistinct, 130-200. Coloration [above with dark transverse bands, broadest in the middle; these bands] often forming complete rings round the body.

Dimensions.

	mm.
Total length	750
Snout to vent	670
Vent to tip of tail	80

Habitat.—The claim of Lapemis hardwickii to a place in the Japanese fauna is doubtful. Schlegel enumerates and figures the species in Fauna Japonica, as Hydrophis pelamidoides, but the only reason given in the text is as follows: "A specimen of this curious reptile, collected in the seas south of Japan, has recently been brought to Holland. We hesitate the less in admitting this Hydrophis among the number of animals belonging to the fauna of Japan, inasmuch as it furnishes us an opportunity for publishing an exact figure of this species." The implication is that the specimen was not actually taken in Japanese waters, and so far as I know no later capture is on record. However, Mueller reports recently a specimen in the Basel Museum from the China Sea, and as the species appears to be common on the west side of Luzon, there is every chance that it may eventually be taken within our limits.

To the west the species is known in the Bay of Bengal and in the south to the coasts of New Guinea and Java.



ENHYDRINA VALAKADYN (FROM JAN ,
FOR EXPLANATION OF PLAYE SEE PAGE 555.

Diagnosis.—Rostral deeper than broad; frontal small, longer than broad, shorter than its distance from the end of the snout or than the parietals; one pre- and one or two postoculars; 7 or 8 supralabials, fourth or third and fourth entering the eye; usually a single anterior temporal; [symphysial shield narrow, partly concealed in a deep groove in the chin]; chin-shields small or indistinct; 40 to 60 scales round the neck, 50 to 70 round the body; scales feebly imbricate, with a small tubercle or short keel, which is stronger in the males; ventrals very slightly enlarged, 230–314. Young olive or gray above, with black transverse bands, broadest in the middle, and tapering to a point on the sides; in the adult these bands are usually less distinct, some specimens being uniform dark gray above; sides and lower parts whitish.

Dimensions.

	mm.
Total length	1, 300
Snout to vent	1, 110
Vent to tip of tail	190

Habitat.—The Valakadyen is introduced here mainly on the strength of a specimen recorded by Jan as being in the Milano Museum with the locality "Japan." This is ordinarily a very doubtful authority, and the chances are that the specimen was not taken in Japanese waters. Yet, with the possibility that it may be the species which von Siebold referred to in 1824 (see p. 437), I have thought it best to include a brief characteristic, as it may occasionally, at least, drift as far as Formosa, or farther, notwithstanding the fact that it has not been reported by others north of Cochin China.

This species is known from Arabia in the west to the Malay Archipelago, Papuasia, and Siam in the cast. It is said to be "incredibly numerous" in the Bay of Bengal, at Pinang and Singapore.

Genus HYDRUS Schneider.

- 1799. Hydrus Schneider, Hist. Amph., I, p. 233 (type, H. bicolor).
- 1802. Hydrophis Latreille, Hist. Nat. Rept., IV, p. 193 (substitute for Hydrus Schneider).
- 1803. Pelamis Daudin, Hist. Nat. Rept., VII, p. 357 (substitute for Hydrophus Latreille).
- 1830. Pelamys Wagler, Syst. Amph., p. 166 (emendation).
- 1848. Elaphrodytes Gistel, Naturg. Thierr., p. ix (substitute for Hydrus).

The type of *Hydrus*, as ascertained by the process of elimination, is *H. platurus*. Latreille changed the name *Hydrus* into *Hydrophis* simply because the French name "hydre" was preoccupied for another animal, the *Hydra*. It is, therefore, a synonym pure and simple and must have the same type as Schneider's *Hydrus*. Daudin's *Pelamis* of the following year has precisely the same status,

as he invented another name for no other reason than "elles habitent dans la mer." Hydrophis and Pelamis are consequently unavailable as names for other genera.

HYDRUS PLATURUS # (Linnseus).

1766. Anguis platura Linner, Syst Nat. 12 ed., I. p. 391 type-locality unknown, type originally in Fr. Ziervogel's pharmacy, Stockholm — Hydrophis platura Latreille, Hist Nat Rept., IV, 1802, p. 197 (islands of the Pacific Ocean) — Hydrus platurus Boullenger, Fauna Brit India, Rept., 1890 p. 397, Cat Sn. Brit Mus., IH, 1896, p. 267 (Indian and Pacific oceans. Ooshima, Loo Choo Is., Formosa) — Boettger, Kat Schl Mus. Senckenberg., 1898, p. 112. - Steineger, John Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 223. Killing Formosa, Pescadores Is.) — Wall, Proc. Zool. Soc., London, 1903. pp. 95, 101 (Hongkong, Formosa, Loo Choos); 1905. II, p. 516 (Okinose, Sagami) — Nikolski Zap. Imp. Akad. Nauk, S. Peterburg., 8), XVII, no. 1, 1905, p. 291 (Possiet Bay).

1788. Ang its platures GMELIN, Syst. Nat., I, Pt. 3, p. 1122 (Pine Isle, Pacific Ocean;

Forster, collectory emendation;

1799. Hydrus bicolor Schneiden, Hist Amph., I, p. 242 (type-locality not specified, specimen in Mus Blochianum Pelamis bicolor DAUDIN, Hist. Nat Rept , VII 1803, p 366 Bengal Swinhor, Ann Mag Nat. Hist. (3), XII 1863 p 225 (Kelung, Tainsut River Formosa) STRAUCH, Mém Acad Sci Pétersb (7), XXI, no 4, 1873, p 199 Possiet Bay, Siberian Coast Province Hildenborg, Mitth Deutsch Ges Ost -Asiens, I, helt 10, July, 1876, p. 30 (Prov. Kaga, Hondo, Setana), Prov. Kumashiri, Yezo) Martens, Preuss Exped Ost-Asien, Zool, I, 1876, p. 382 (Strait of Formosa). Doederlein, Mitth. Deutsch. Ges. Ost-Asiens, III heft 25, Dec 1881 p 210 (west coast of Hondo and Yezo Boerroen, Offenbach Ver. Naturk 26-28 Ber., 1888, p. 91 (Hongkong Hydrophis (Pelanis) bicolor Fischer, Abh Naturw Ver Hamburg, III, 1856, p. 61 Andran Ocean, west coast Mexico, Hydroplus becolor Jan, Icon Opind Irvr 40, 1872, pl 11 fig 4, pl, 111, fig. 2 (China Sea). -Okada, Cat Vert. Japan, 1891, p. 69 (Noto; Hoki, Totomi; Idzumo

1817 Pelawis schneider: RAFINESQUE, Amer. Month. Mag , I, p 432 (substitute name for Hydrox booler Schneider)

1837, Hydrophas palamas Schlegel, Phys Serp., I, p. 187, H, p. 508; Atlas, pl. xviii, figs. 13-15 (substitute name); Fauna Jap., Rept., 1837, p. 90 (voyage between Java and Japan, north to 27° N. lat.) -Boettger, Offenhach Ver, Naturk 17, 18 Ber., 1878, p. 8, Japan).

1837 Hydrophis pelamis var. Schlegel. Fauna Jap., Rept. Ophid., pl. vin (Borneo).

1842 Pelanus omaia Gray, Zool, Miscell, p. 60 (type-locality, India, type in Brit. Mus.).

1854 Pelanos heolor var variegata Di Merri, and Bibros. Erpét. Gén., VII., Pt. 2, p. 1337 (Macassar Celebes – Jan., Icon Ophid., hyr. 40, 1872, pl. ni. fig.3.

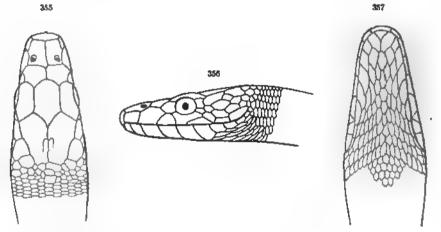
1854 Pelanus bicolor var sinuata Di MERIL and BIBRON, Erpét Gén., VII., Pt. 2, p. 1338 (locality unknown).

1858. Hydrophis (Pelamis) bicolor var. alternans Fischer, Abh. Naturw. Ver. Hamburg III 1856, p. 63 embstitute for var. variegata

1883 Hydrophis burder var macedata Jan, Elenco Sist Ofid. p. 109 (Indian Ocean); Icon. Ophid., livr. 40, 1872, pl. ut, fig. 1.

There are several well-marked color varieties which have received varietal names. Their exact status has not been made clear, but while it is true that they do not seem to represent local races, there is nevertheless a certain regularity in their distribution. Thus the ordinary black-backed form seems to be almost exclusive in the Pacific Ocean; spotted individuals, such as the one figured in Fauna Japonica, plate VIII (from the west coast of Borneo) appear to occur mostly in the Indian Ocean. All the specimens from eastern China, Formosa, Riu Kiu, and Japan, so far as the records show, are of the black-backed form.

Description (figs. 355-357).—Adult female; U.S.N.M. No. 17518; harbor of Nagasaki, Kiusiu; December 15, 1883; P. L. Jouy, collector. Head very depressed; snout elongate, the distance from eye to tip of snout equaling the width of head at posterior end of supra-



Figs. 355–357.—Hydrus platurus. $1\frac{1}{4} \times Nat$ size. 355, top of head, 356, side of head; 357, underside of head. No. 8, Sci. Coll. Tokyo.

oculars; rostral nearly as high as broad, well visible from above; nasals not much longer than prefrontals, the suture between the former about twice as long as between the latter; frontal much longer than its distance from tip of snout and nearly as long as parietals, much wider than supraoculars; parietals long, with irregular outlines, a small intercalated shield in the suture between them; no loreal; a long preocular, pointed anteriorly; two suboculars; two postoculars; three anterior temporals; ten supralabials, second largest, in contact with prefrontals, fourth to tenth small and low, none entering eye; no differentiated chin-shields; 61 scale rows around middle of body, the scales hexagonal, juxtaposed, smooth; no differentiated ventrals or subcaudals; two slightly enlarged scales, one at each side in front of vent; terminal scale on tail somewhat enlarged. Color (in alcohol) on back dark scal-brown, sides and underparts abruptly clay-colored, the

boundary between the two colors being a straight line until a short distance in front of the vent where it becomes wavy; top of head like back, supralabials like underside, lower labials washed with brown; tail straw-yellow, with a series of about six dark brown roundish blotches along the upper and the lower edge and a median series of smaller ones on the sides.

1hmensions					
	771 173				
Total length	609				
Shout to vent	528				
Vent to tip of tail	- 81				
Width of head across center of eyes,	14				
Length of shielded portion of head .	31				
Greatest height of body	38				
Greatest height of tail	20				

The males have a somewhat slenderer body, fewer scale rows, and the scales have a central tubercle.

Variation. This species is exceedingly variable; especially the shields of the sides of the head are subject to so numerous modifications that it is hardly profitable to enumerate them in view of the striking appearance of this snake, which makes the identification of the species one of the easiest. It may be mentioned, however, that the supralabials may vary between 7 and 11; one or more loreals may be present; suboculars may be present or not; two anterior chin-shields may be sometimes recognized in a pair of enlarged scales never in contact, however. In our specimens the number of scale rows varies between 49 and 61, the higher figures belonging to the females, while Boulenger gives 45 to 47 as the normal number.

The coloration is also very variable, and mention has already been made of the spotted form from the Indian Ocean (p. 440). In the black-backed form which is the only one found in the eastern waters, the tail is most subject to variation, inasmuch as the spots on the upper and lower edges may join so as to form blackish cross-bands, or they may disappear on the lower edge entirely. In many specimens there may be seen on the sides between the blackish color of the back and the more or less dirty clay-color of the belly a broad yellow band.

Habitat Probably the most widely distributed species of snake, occurring as it does on all the coasts and islands of the Indian and Pacific oceans within the Tropics and even extending its range in many places considerably beyond the tropical waters, thus in the southern hemisphere to the Cape of Good Hope and to New Zealand. In the northern hemisphere it has been found on the eastern coasts of Asia as far north as Yezo and the Russian Coast Province

Beyond the tropics, however, these snakes are only carried occasionally by the warm currents. Thus while they are yet of regular occurrence around Formosa, they become gradually scarcer in the

Riu Kius, although stray individuals are picked up rather frequently on the coasts of Japan proper. A Formosan specimen is in British Museum collected by Swinhoe, and Mr. Tada also obtained it in that island and recorded it from the Pescadores Islands; British Museum furthermore has a specimen collected by Mr. Ferrié in Amami-oshima, Riu Kiu, and Doctor Wall saw two or three more specimens in Mr. Owston's collection from the shores of the Riu Kius. Authentic records for Japan proper show specimens obtained on the eastern and the western shores. Thus Jouy collected one in the harbor of Nagasaki on December 15, 1883; Okada mentions it as having been found in the provinces of Idzumo, Hoki, and Noto, and Hilgendorf records a specimen from the province of Kaga, all in Hondo, in the Sea of Japan; the latter author also mentions having seen a specimen from "Setanai (Prov. Kunasiri)" a in the exhibition of the government of Hokkaido. Doederlein mentions another specimen from Yezo, probably also from the west coast.

From the east coast we have in the U. S. National Museum two specimens from the Bay of Sagami, one from the Bay of Suruga, and one from Inatori, province of Idzu, opposite O-shima; Doctor Wall mentions another specimen from Sagami Bay, and Okada records the species from Omaya Saki, province of Totomi.

On the mainland side of the sea of Japan, Dr. B. Dybowski collected a specimen in Possiet Bay, near the Korean boundary, the specimen, according to Strauch, being in the museum in Warsaw.

1	List	of	specimens	of	Hydrus	platurus.

Museum.	No.	Sex.	Locality.	When collected.	By whom collected or from whom received.	Scale rows.
U.S.N.M	17518	Female a.	Nagasaki, Kiusiu	Dec. 15, 1883	P. L. Jouy	61
	1		Inatori, Idzu, Hondo			
Do	33964	¹ do	Sagami Bay, Hondo	Apr, 1902	do	52
Do	33965	Female	do	do	do	57
Do	33966	Male	Suruga Bay, Hondo	Jan. 12, 1904	do	53
Sci. Coll. Tokyo	. 8	do.b	Kilung, Formosa	Nov, 1897	T. Tada	50
	i	1				
a Desc	ription	D. 440.	. b h	igs. 355-357.		

Family COBRIDÆ.

As will be seen from the explanation under the generic name of the only species of this family treated of in this work, the term Vipera, from which the family name Viperidx is derived, must be superseded by Coluber. The confusion necessarily resulting from this transfer of

a Kunashiri is an island off the northeast extremity of Yezo, but I have been unable to find on my maps any locality of that name on Yezo itself. There is, however, a Setanai in the province of Shiribeshi, on the west coast of Yezo (about 42° 30′ N. lat.) which is possibly the place meant.

the latter name would be still more far-reaching were we compelled to derive the new family name from it. Under these circumstances it seems preferable to give a new family name derived from the generic term of the African vipers nearest related to the genus Coluber. This genus is Laurenti's Cobra, which is equivalent to Bitis given much later. To have adopted the family name Causida and giving it a much wider significance than intended by its originator would also lead to confusion.

The chief characteristic of this group is the shortness of the maxillaries on which the large poison fangs are placed immovably. The maxillary bone is so connected with the other bones of the skull as to be readily movable in a vertical direction so that the fangs can be raised or folded back at will. This apparatus is essentially the same as that of the Crotalids and will be described more in detail under the latter, the chief difference being that in the vipers the maxillary is not scooped out, while in the Crotalids it has a deep hollow for the loreal pit.

The vipers are confined to the Old World and are found mostly in Africa. A number of forms also inhabit the palearctic region, one species thus coming within our province, while only a single viper inhabits the Indian region proper, and none the Malay archipelago or Australia.

Genus COLUBER & Linneus.

1758 Coluber Lannetts Syst Nat 10 ed., I, p. 216 type, C. berus).

1768 Urpera Laurenti Syn Ropt , p. 99 (type, 1 allyrica)

1820 Pelius Merrem, Syst. Amph. p. .48 (ypc, Coluber berus,.

4820 Beros Golder sz. Handh Zool. II. p. 444 type, 17pera beros; not of Oken, 1816.

1822 Chernea FURMING Philos Zood , H p 295 (type, C rulgaris=Coluber berus).

The name Coluber was instituted by Linnaus in 1758 for the great majority of snakes and the "genus" so designated embraced poisonous as well as nonpoisonous snakes. The term since then has been applied to widely different groups of serpents, and there is hardly a name in ophiology which has been more in dispute, or attributed to more kinds of snakes than that of Coluber. It has been restricted so as to fall entirely within the Pythonida, the Viperida, or the agly-phodont Natricoids. All sorts of schemes for ascertaining the type to which the name might be fastened have been tried, but without satisfactory results, and even the same author has at various times applied it to widely different genera.

[&]quot;According to the International Code art 5, the name of a family or subfamily is to be changed when the name of its type genus is changed

b General Latin term for stake

See for instance Cope, Proc. U.S. Nat. Mus., XI, p. 389.

In order to settle the question according to the International Code of Zoological Nomenclature we must turn to its article 30, which reads as follows:

If the original type of a genus was not indicated, the author who first subdivides the genus may apply the name of the original genus to such restricted genus or subgenus as may be judged advisable, and such assignment is not subject to subsequent change. In no case, however, can the name of the original genus be transferred to a group containing none of the species originally included in the genus; nor can a species be selected as type which was not originally included in the genus, or which the author of the generic name doubtfully referred to it.

Linnæus, of course, did not indicate a type, and "the author who first subdivides the genus may apply the name of the original genus to such restricted genus or subgenus as may be judged advisable, and such assignment is not subject to subsequent change." The first one to do this is unquestionably Laurenti, in 1768. He dismembered the enormous genus Coluber of Linnæus and left comparatively few species Five of these are additional to those included by Linnæus in his original Coluber of 1758, and are consequently ineligible as types, because a species can not "be selected as type which was not originally included in the genus." The type must of necessity, therefore, be selected from among the remaining Linnæan species, viz, Coluber stolatus, buccatus, sibon, chersea, and berus, the two last-mentioned being in reality only one species. It now so happens that only one of these has been designated by a subsequent writer as type of the genus Coluber, viz, C. berus, which was so designated by Prof. Robert Collett, in 1878, and in the words of article 30 'such assignment is not subject to subsequent change." b The result is fully consonant with the "recommendation" accompanying article 30, more particularly that part of paragraph C, which provides that "if the genus contains both exotic and nonexotic species, from the standpoint of the original author, the type is to be selected from the nonexotic species," inasmuch as C. berus is the only nonexotic species among the eligible spe-That this result also agrees with Laurenti's "intention" has been well shown by Cope, who expressly remarks that "the poisonous species are, then, the types of the Coluber of Laurenti."

In a large collection of Russian and Siberian reptiles received by the United States National Museum in 1885 from Dr. Alexander Strauch there are three specimens named Vipera berus which in the invoice are marked thus: No. 32, Dui auf Sachalin; No. 84, Smeinogorsk (Altai); No. 88?, Dui auf Sachalin.

a Christiania Vidensk. Selsk. Forhandl., 1878, no. 3, p. 6.

b It might even be maintained that the same selection was made as early as 1820 by Merrem (Syst. Amphib., p. 148). He subdivided also the genus Coluber, but unfortunately he did not retain the name for any of the subdivisions. But in instituting the genus Pelius for Coluber berus he expressly mentions Laurenti's Coluber as the equivalent.

^c Proc. U. S. Nat. Mus., XI, p. 389.

The original parchment tags with the numbers are still attached to the specimens which represent two species as follows. No. 32 (U.S.N.M. No. 14325) Coluber berus; No. 84 (14324), Coluber berus; and No. 88 (14318), Coluber renardi. It should be noted that the question mark following 88 in the invoice is not found on the parchment tag; also that there is another No. 88, viz, a Natrix hydrus, from Mangyshlak, Transcaspia (U.S.N.M., No. 14327). This question mark in the invoice throws some doubt upon the accuracy of the whole entry rendering the locality Dui on the island of Sakhalin for Coluber renardi very dubious in the face of the fact that this species hitherto has not been recorded from any locality cust of the Altai Mountains. On the other hand, it must not be forgotten that Coluber berus and C. renardi occur in the same localities in western Siberia, and that Strauch himself did not distinguish between the two species. Nevertheless, C. renardi can not be admitted to the fauna of Sakhalin upon the strength of our specimen alone, the locality of which must be regarded as erroneous until corroborated by additional material.

Coluber renardia is quite distinct from C. berus. Our specimen (female) has 21 scale rows, 145 ventrals, and 25 subcaudals and shows all the characteristic features of the species, such as Snout pointed, hollow with swollen canthal edge; one apical scale only in contact with the rostral; upper preocular long, anteriorly touching nasal; nostril small, located in the lower half of the nasal. The scutellation of the top of the head is almost identical with Boulenger's figure c on Plate LXIV.

COLUBER BERUS! Linnaus.

1758 Colaber berus Linn #1 8, Syst Nat , 10 ed , I p 2)7 (type-locality, Europe);
12 ed I, 1766, p 377 Lairenti Syn Rept 1768, p 97. Vipera berus
Dathin, Hist Nat Rept , VI, 1803, p 89 Middenborff, Sibir Reise,
II, n, Pt 1 1853, p 247 Udskor Ostrog: sources of the Riv Tugur)
Straich, Mém Acad Sci St Pétersb (7) XXI, no 4, 1873, pp 206,
279 (Ussuri; Hadshi Bay, Udskor Ostrog, Usut Island Sakhalin, Nikolayevsk, Possiet Bay) Jan, Icon Ophid , livi, 45, 1874, pl It Nikolski Zap Imp Akad Nauk, S. Peterburg LX Prilozhen no 5, 1889,
p 290 (Sakhalin , Zap Imp Akad Nauk S Peterburg (8 , XVII, no 1)
1905 p 303 (Russia to Sakhalin) Boulescer Ann Mag Nat Hist 6),

O 1861 Pelias renardi Christoph, Bull. Soc. Nat. Moscow, XXXIV. Pt. 2, p. 599 (type-locality Sarepia SE Russia). Vipero renardi Bot lenger Proc. Zool. Sec. London. 1893. pp. 598-757, pl. 1xiv. Southeastern Russia to castern. Turkestan. Cat. Sn. Brit. Mus., 111, 1896, p. 475 (southern Russia and central Asia.)

Named for councilor of State, Doctor Renard, then editor of the Bulletin of the Imperial Society of Naturalists of Moscow

^b Proc Zool See London, 1893

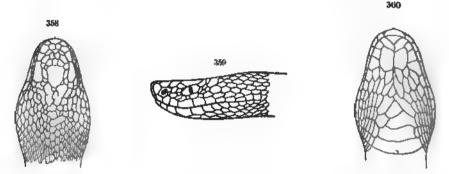
^{**}Berns as the name of a water snake, probably Natric natric, is said to be used first by such medieval writers as Albertus Magnus, Vincent de Beauvais, etc.

V, Feb. 1890, p. 139 (Possiet Bay to Sakhalin); Cat. Sn. Brit. Mus., III, 1896, p. 476 (Sakhalin) — Pelias berus Dobrotvorski, Izvest. Sibir. Otd. Geogr. Obstchest., I, 1870 (р. 23) (Sakhalin).—Doddelein, Mitth. Deutsch. Gcs. Ost-Asiens, III, heft 22, Dec. 1880, p. 89 (Sakhalin).

1822. Chersea rulgaris Flemino, Philos. Zool., II, p. 295. Berus rulgaris Swainson, Classif. Fish. Amph. Rept., II, (Lardner's Cab. Encycl.), p. 362.

The numerous synonyms based upon European color varieties are here omitted.

No distinctions have been pointed out between east Asiatic and European specimens, and no tangible ones seem to exist. It is perhaps worth noticing that the number of ventrals of all the eastern specimens recorded is rather high, viz, between 143 and 158, averaging about 150, while in a large number of western specimens (167) the average is about 145. This tendency toward a lower number



Figs. 358-360. Coluber berus. $44 \times$ Nat size. 358, for of fight, 359, side of head, 360, underside of head. No 14325, U.S.N.M.

of ventrals in the west is shown by a still lower average of 143 ventrals in 54 British specimens or even 137.5 in 11 specimens from the Pyrenean peninsula.

Description.—Adult female: U.S.N.M. No. 14325; Dui, island of Sakhalin (figs. 358-360). Rostral slightly higher than wide, well visible from above; snout above covered by about 16 scales, the fragments of internasals and prefrontals, of which two join the rostral and two larger ones cover the canthus rostralis between naso-rostral and supraocular; frontal as long as its distance from tip of snout, wider than supraoculars, from which it is separated by a series of scales; parietals irregularly broken up, the two large shields adjoining the frontal somewhat smaller than the latter; nostril large, in the middle of the posterior nasal, the anterior nasal, or prenasal, not entering nostril and therefore also known as naso-rostral; three loreals behind posterior nasal, one above, two below; eye on sides and below surrounded by nine scales, ten on right side; temporals numerous scales, more or less irregular, those of the anterior row not larger than the postoculars; nine supralabials, fourth and fifth largest.

situated under the eye and separated by a single row of scales; four lower labials in contact with anterior chin-shields which are much larger than the posterior; 21 rows of scales, all except outer row keeled and with two apical pits; 146 ventrals; anal entire; subcaudals in pairs, 22+ (tail defective). Color (in alcohol) above tawny-olive with a brownish black, very distinct zigzag band along the middle of back and tail, and a series of obscure, alternating, lateral spots; top of head brownish black continuous with a similarly colored chevron mark opening backward on occiput; a brownish black band from nostril through eye over lower temporals to the side of neck passing over the last supralabial at angle of mouth; canthus rostralis and supralabials yellowish, the latter mostly with a black line along the posterior suture; chin and throat yellowish, mottled with dark slate color; whole underside uniform slate black, each ventral narrowly edged with pale olive.

Inmensions	
	m m
Total length (tail defective,	568
Snow to vent	520

The proportion of tail to total length in the female averages as 1 to 9.33

In the male the tail is considerably longer, with more numerous subcaudals, the proportion to total length averaging as 1 to 7.33.

The viper very rarely exceeds 700 mm in total length.

Variation. The specimen described above represents the average of this species, but both scutellation and coloration are very variable. The degree of breaking up of the normal shields of the head is thus very different in different individuals, so that two specimens exactly alike can rarely be found; thus the frontal may be in contact with the supraoculars, or on the other hand it may be separated from the parietals by a series of scales; number of scales around the eye varies between 6 and 13, of supralabials between 6 and 10. The variation in number of ventrals and its correlation with the geographical distribution has been alluded to above (p. 446).

The coloration is also exceedingly variable, at least in European specimens, the ground color varying through all the shades of brown and olive from silvery gray to black, and the pattern showing endless modifications of the one described above which may be said to be typical.

Habitat. -The common viper extends from western Europe to the Japanese and Okhotsk seas in the East.

Numerous specimens were collected in the island of Sakhalin by Prof. F. Schmidt, in 1863. Nikolski says that this snake is very common on the island, that Dobrotvorski noted it in the southern part and that Poljakof collected a specimen in the neighborhood of Korsakovski.

Maack obtained it in Ussuri, and von Schrenck in various parts Amurland. Dybowski sent to the museum in Warsaw, Polanc specimen taken at Possiet Bay near the boundary between Ko and the Russian Coast Province, according to Strauch, who also m tions its occurrence at Udskoi Ostrog.

The United States National Museum has one specimen fr Sakhalin obtained from the St. Petersburg Academy. The muse in Hamburg has three specimens collected by Dieckmann at Nike yevsk (No. 2162).

List of specimens of Coluber berus.

					_				
Museum.	No.	Bex.	Locality.	When col- lected	By whom col- lected or from whom received.	Scale rows.	Veptrals	Subsandale.	Oeulars.
U.S.N.M	14326	Female =	Dul, Sakhalin Island		St. Peteraburg Academy	21	146 1		9-10
Brit. Mus	q+	, do.5	Sakhalin Island., .		.,do, ,,, ,	21	158 1	33	
Do	8.4	. do.b	de		do	21	143 1	33	
St. Peters-	1031	(e)	Dui, Sakhalin		F. Schmidt	21	152	32	
hurg.							1		
Do	1032		,,.,do ,		do	21	149	30	
Do	1028		Ussuri .		Masck	21	153	. 33	
Do	1029		Bay Hadshi, \murl		L. v. Schrenck.	21	158	. 30	
Do	1030		Utent Island, Liman		do	21	151	32	
Do	1035		Nikolayevsk		do .	21	146	. 38	
<u> </u>									

Description p. 446, figs. 358-360.

Family CROTALIDÆ.

The "pit vipers" receive their name from the deep pit or hole the side of the face between the nostril and the eye, as showr fig. 363. This cavity sinks deep into the maxillary bone and rej sents a "blind" sac lined with epidermis and not connected with a of the other cavities or organs in the head by any inside opening canal.

The maxiltary bone, into the lower end of which the large holl fang is immovably fastened like the knife in a handle, is extrem shortened and higher than long so as to appear to be in a vertiposition (fig. 361). On the outer face of this bone there is the decayity forming the bony walls of the pit already referred to, wh separates two articular surfaces. The upper one at the top of maxillary forms with the corresponding concave face of the lachryr (prefrontal) bone, which projects from and articulates with the fron bone, a hinge-like joint allowing considerable freedom of moting the lower articular surface receives the flattened anterior end of external pterygoid bone (ectopterygoid or transpalatine). It will

⁵ Boulenger, Cat., III, p. 481.

eStrauch, p. 279.

seen from the accompanying cut (fig. 361) that if the latter bone (a) be moved forward or backward, the maxillary (d) hinges on the lachrymal (prefrontal) (e) and that if the ectopterygoid be pushed forward the fang is erected.

For a more detailed description of the poison apparatus, the poison,

etc., see my Poisonous Snakes of North America.^a

The Crotalid snakes are found in both hemispheres. They are entirely absent, however, in Africa and the southwestern corner of Asia, as well as in Australia. They are practically unknown in Europe also, except that one species enters the extreme southeastern corner.

The general impression that the Crotalidæ are overwhelmingly American in their distribution is entirely erroneous, as nearly 40 per

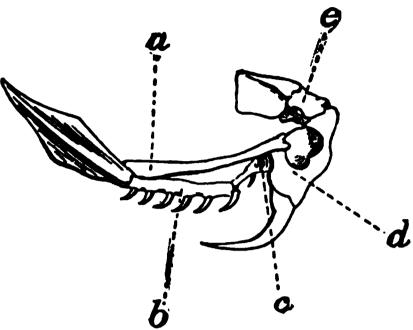


Fig. 361.—Poison apparatus of a Crotalid Snake. Right side. a, External pterygoid bone (ectopterygoid or transpalatine); b, internal pterygoid bone (entopterygoid); c, palatal bone; d, maxillary bone; e, lachrymal bone (prefrontal). (After Mitchell.)

cent of the known species occur in Asia, and I am strongly of the opinion that the family originated in the Old World and spread to America afterward. The rattlesnakes which are peculiar to the latter continent are the latest specialization of the type.

KEY TO JAPANESE GENERA OF CROTALIDÆ.

Genus AGKISTRODON b Beauvois.

- 1799. Agkistrodon Beauvois, Trans. Amer. Philos. Soc., IV, p. 381 (type, A. mokasen).
- 1802. Scytale Latreille, Hist. Nat. Rept., III, p. 158 (same type).
- 1803. Cenchris Daudin, Bull. Soc. Philom. (Paris), III, No. 72, March 1803, p. 188 (same type).
- 1819. Scytalus Rafinesque, Am. Journ. Sci., I, p. 84 (emendation).
- 1826. Tisiphone Fitzinger, Neue Class. Rept., pp. 34, 63 (type, T. cuprea).
- 1826. Trigonocephalus Boie, Isis, 1826, p. 214 (not of Oppel, 1811).
- 1836. Acontias Troost, Ann. Lyc. Nat. Hist. N. Y., III, p. 190 (type, A. leucostoma; not of Cuvier, 1829).
- 1836. Toricophis Troost, Ann. Lyc. Nat. Hist. N. Y., III, p. 190 (same type).
- 1849. Halys Gray, Cat. Snakes Brit. Mus., p. 14 (type, Trigonocephalus halys Boie; not of Fabricius, 1803).
- 1854. Ancistrodon Baird, Serp. N. Y., p. 13 (emendation) (not of Roemer, 1849).

Among the species of the genus Agkistrodon which extends from the northern borders of the Caspian Sea throughout most of the Asiatic

a Rept. U. S. Nat. Mus. for 1893, pp. 365-380 and 457-480.

^b From αγκιστρον, hook; δδών, tooth. The correct transliteration would be Ancistrodon.

mainland and in North and Central America there is a small congroup consisting of the species A. halys, blomhoffii and himalo occupying the vast territory from the Caspian Sea in the west Pacific Ocean in the east, and from Lake Baikal in the north Himalayas in the south. They are closely interrelated, in fact so allied that their descent from a common ancestor can not have place at a very distant period. Of these, A. blomhoffii, which only species occurring within our limits, shows certain differences according to locality, making it advisable to discript between several forms.

The Agkistrodon intermedius which Strauch described in 186 characterized as an A. blomhoffii with 23 scale rows, Boulenger, other hand, diagnoses as an A. halys without the snout turn Practically both seem to be right, for as far as I can see A. in dius, as accepted by them, is not a well-defined form (much species as this term is used conventionally), but an aggregation o or less intermediate specimens. In the sense in which they been adopted hitherto neither have a definable range. Accord Strauch not only does A. blomhoffii occur in the same localities mainland as A. intermedius, but the latter occurs also in Japa miscuously with the former, as individuals with 23 scale rows both in southern and northern Japan. The trouble is that the n of scale rows is not constant, the inconstancy apparently vary some extent with the locality. On the other hand, to what exte turning up of the end of the snout may serve in all instances as a acter to separate A. halys I can not say for lack of material, a that reason I shall at present treat the latter as a good species.

For the study of A. intermedius and A. blomhoffii I have coabout 100 more or less complete scale formulas of individual mens, all of which will be found in the appended tables.

Table Ia is a record of 27 specimens of undoubted Japanese of They show A. bloomhoffii in its purity with a normal scale form 21 scale rows; 132–146 ventrals (average 141.3); 44–56 pairs of caudals (average 49.2); and 7 supralabials. Two of the speciment the United States National Museum, viz. Nos. 31866 and have 23 scale rows, and Strauch mentions that in the Leiden M he found some specimens from Japan also with 23 scale rows Hilgendorf records one of his Tokyo specimens as having 23 On the other hand, the number of supralabials (7) seems to be lutely constant in Japan.

Table II contains formulas of 20 specimens from Korea, eastern China, and Formosa, viz. 21–23 scale rows; 138–151 ve

[&]quot;For reasons given farther on (p. 452). I have not included in this table specimens in the St. Petersburg Academy Museum, recorded by Strauch a from Japan.

(average 143.8); 29-46 subcaudals (average 35). The supralabials are not given in detail, but judging from Boulenger's account all the specimens examined by him had 7. One of my Korean specimens has 8 supralabials on one side. It will be seen that these formulas agree tolerably with those from Japan except that the subcaudals are much fewer.

Tables III and IV embrace the specimens recorded from the region lying to the north and northwest of those contained in Table II—i. e., from the Russian Coast Province and the River Amur to eastern Turkestan. They represent mostly the specimens attributed to A. intermedius by Strauch and Boulenger. They agree in having an intermediate number of subcaudals, viz, 36-49 (average 41) and [32] 37-53 (average 43.7), respectively. They also agree fairly well in the number of ventrals, viz, 151-163 (average 155.8) and [147] 154-179 (average 163.5), respectively, but it will be seen that these figures greatly exceed the corresponding ones of Tables I and II. There is, however, one marked difference between Tables III and IV, since it will be found that among the specimens collected east of the Khingan Mountains in Manchuria (Table III) the great majority (70.6 per cent in a total of 17 specimens) have 21 scale rows, while of those from the Khingan Mountains and the country to the west, viz, Mongolia, Transbaikalia, and eastern Turkestan, the greater number (76 per cent, in a total of 29 specimens) have 23 rows or more.

Before proceeding farther a few words may be said regarding Table Ib. The two specimens from Yaeyama in the United States National Museum agree structurally and in their scale formulas exactly with the Japanese specimens, but they differ exceedingly from the latter in color. Their ground color (in alcohol) is a "tawny olive," uniform on top of head, but indistinctly varied and marbled on back and sides with blackish and with indications of pale cross bands; a band slightly darker than the ground color through eye and temples; lips whitish, as is also the whole underside; each ventral sprinkled with irregular blackish brown dots and spots on the basal half. It seems probable that they represent a permanent local color race, and are so recognized further on.

The differences between the specimens listed in Tables I-IV may be synoptically expressed as follows:

 a^1 Ventrals 151 or less.

b¹ Subcaudals 43 or more.......Tables I and Ia (Japan and Yaeyama Islands).

 a^2 Ventrals 147 or more.

b¹ Scale rows (in 70.6 per cent) 21.. Table III (Coast Province; Amurland, west to Khingan Mountains).

b² Scale rows (in 79 per cent) 23....Table IV (Khingan Mountains to East Turkestan).

It will be seen that a considerable amount of intergradation occur Thus it would be impossible to say to which of the three forms (Tal II, III, or IV) a specimen with 151 ventrals and 45 subcaudals were be referred, unless it had 8 supralabials, in which case it wo probably be correct to refer it to either Tables III or IV, with chances in favor of Table III, if it had 21 scale rows, and in favor Table IV if it had 23 rows. Unfortunately, the number of supralab is not given in detail in the recorded scale formulas, or we might phaps have been able to make a more definite statement. We oknow in a general way that quite a large number of the specim included in Tables III and IV have 8 supralabials, and I hold it to probable that there are more having 8 supralabials in Table IV the in Table III.

I now call attention to Table V, containing the records of f specimens in the Zoological Museum of the St. Petersburg Academy Sciences, which are reported to be from Japan. These, with a num of other snakes, were sent to the academy in 1861 by Mr. Gosch witsch, who was Russian consul at Hakodate, Japan; hence Straconcluded that they were from Yezo. Of the five Agkistrodons. referred No. 2225, with 23 scale rows, to A. intermedius; the other for with only 21 scale rows, to A. blomhoffii, the typical Japanese spec Upon this evidence rests the admittance of A. intermedius into fauna of Japan proper. A glance at Table V shows at once, hower that the five specimens did not come from the island empire at They belong most assuredly to Table III, within the limits of wl not only the extremes are easily accommodated but with the average which their own averages nearly coincide (ventrals, respectively, 1! and 155 8; subcaudals 42 and 41). If we consider, furthermore, 1 Mr. Goschkewitsch sent two other species, which nobody else has fo in Japan (namely, Elaphe dione, see p. 318, and E. schrenckii, see 315), but which occur in the Amur Province, I think there can no a shadow of a doubt that all the specimens sent by him were shipped from Japan but collected somewhere on the mainland, en in the Coast Province or in Amurland.

TABLE Ia.—Japan.

Museum.	No.	Sex and age.	Locality.	Authority.	Scale rows.	Ventrals.	Sulxaudals.	Supralahials.
r. s. n. mi	15421	Female	Omachi, Hondo	Stejneger	21	139	53	. 7
Doi	15422	Young	do	do	21	142	48	7
Do	15423	do	do	do	21	132	47	7
Do	15424	do	¹ do	do	21	144	49	7
Do			do	•	21	139	53	7
Do			do		21	141	54	, 7
Do			Japan					7
Do	23436		Yezo			143	52	; 7
Do	31866	Female	Shikoku	do	23	140	47	7
Do	31867		·do			142	45	7
Do	34023	Female : .	Yokohama	dø	21	140	49	· 7
Do	34024		do			144	56	7
Do	34040		do			137	45	7
Do	34041	1	do			144	55	7
Do	34042	ł	do		i	146	49	7
Do	34043		do		1	143	47	7
		(a)	Japan			142	45	1
ki. Coll. Tokyo	59	•	Hachijo shima			139	46	7
_			Japan				46	
		:	do	•			46	
			do	•			56	
Brit. Mus			do		ĺ	140	48	7
Do	 ь		Yokohama	- -		145	47	7
Do	ŗ		do		:	142	55	7
Do			Tsu-shima		ì	146	46	! 7
Do	f		do		1	138	44	, ,
Do	g		do			145	45	
<i>D</i> ((, , , , , , , , , , , , , , , , , , ,	У	i vung						·
		1	A verage			141.3	49. 2	

a Type of blomhoffii.

TABLE 1b.— Yaeyama Islands.

Do	34039	Yuyeyamadodo	do	21	138	53	7
,		Average		 	138. 0	49. 3	·

a Type of affinis.

ļ

TABLE II .-- (East China; Korea; Formosa.)

	Мижчин,	No.	Sex and age.	Locality.	Authority.	Scale rows.	Ventrals.	Subcaudals
Do	7 S.N.M	14612		Korea	Stejneger	21	142	34
Do 17508 do Seoul, Koren do 21 146 34 sich Univ 1 Young Korea .do 21 150 42 srit Mus 0 Male .Hang-Chau, China Boulenger .21 144 41 Do p .do .Ichang, China .do .21 144 35 Do q Female .do .do .21 143 38 Do r Male .do .do .23 145 31 kiang, China .do .do .21 142 32 Do r Female .Mountains north of Kiu- .do .23 145 31 kiang, China .do .do .do .21 138 29 Do s .do .do .do .21 138 29 Do v Young .do .do .21 138	Do	14613		do	do	21	146	37
lich Univ. 1 Young Korea. do. 21 150 42 crit Mus. o Male. Hang-Chau, China Boulenger.	Do	17507	Male	Fusan, Korea	do	21	148	31
Brit Mus. o Male Hang-Chau, China Boulenger 21 144 41 Do p do Ichang, China do 21 144 35 Do q Female do do 21 140 30 Do r Male do do 21 143 38 Do r Female Mountains north of Kiu- do 23 145 31 kiang, China l do do 21 138 29 Do f do do do 21 138 29 Do f do do do 21 138 32 Do f do do do 21 138 32 Do f y do do 21 138 32 Do f do do do 21 143 31	Do	17508	do	Seoul, Koren	do	21	146	34
Do p do Ichang, China do 21 144 35 Do q Female do .do .21 140 30 Do r Male .do .do .21 143 38 Do s Female Mountains north of Kiudo .do .23 145 31 kiang, China .do .do .do .21 138 32 Do s .do .do .do .21 143 31 Do s .do .do .do .21 145 46	tich Univ i	1	Young	Korea	do	21	150	42
Do q Female do .do .21 140 .30 Do r Male .do .do .21 143 38 Do s Female Mountains north of Kiu- .do .23 145 31 kiang, fhina. Lo .do .do .21 142 32 Do s .do .do .do .21 138 29 Do s Female do .do .21 138 32 Do s Female do .do .21 143 31 Do h Male Formosa .do .21 143 31 Do h .do .do .do .21 145 46 Do k Female Hainan .do .21 144 32 Do s 4o .do .do .21 144 3	Brit. Mus	ø	Male .	Hang-Chau, China .	Boulenger	21	144	41
Do. r Male. do. .do. .21 143 38 Do. s Female Mountains north of Kiu- .do. .23 145 31 Liang, China. .do. .do. .do. .21 142 32 Do. s .do. .do. .do. .21 138 29 Do. v Young. .do. .do. .do. .21 138 32 Do. s Female .do. .do. .do. .21 138 32 Do. s Female .do. .do. .do. .21 138 32 Do. s Male. Formosa. .do. .do. .23 151 40 Do. s .do. .do. .do. .do. .21 145 46 Do. k Female Hainan .do. .21 144 32 Do. s .do. .do. .do. .do. .21 144 32 <td>Do</td> <td>P</td> <td> do</td> <td>Ichang, China</td> <td>do,</td> <td>21</td> <td>144</td> <td>35</td>	Do	P	do	Ichang, China	do,	21	144	35
Do. s Female Mountains north of Kiu- do. 23 145 31 bo. tdodododo. 21 142 32 Do. sdodododo21 138 29 Do v Youngdodododo21 143 31 Do. b Femaledododo	Do	q	Female	. do	oh	21	140	30
	Do	r	Male	do	do	21	143	38
Do f .do .do .21 142 32 Do s .do .do .21 138 .29 Do v Young .do .do .21 138 .32 Do s Female .do .do .21 143 .31 Do h Male Formosa .do .23 151 .40 Do f .do .do .do .21 145 .46 Do k Female .Hainan .do .21 144 .32 Do l .do .do .do .21 144 .32 Do m Young do .do .do .21 144 .39	Do		, Female	Mountains north of Kiu-	do	23	145	31
Do. 38 do. do. 21 138 29 Do. v Young. do. .do. 21 138 32 Do. w Female .do. .do. 21 143 31 Do. h Male. Formosa. .do. .23 151 40 Do. f .do. .do. .do. .21 145 46 Do. k Female Hainan. .do. .21 144 32 Do. ldo .do. .do. .21 144 32 Do m Young do. .do. .do. .21 144 39					1		'	
Do v Young do do 21 138 32 Do w Female do do 21 143 31 Do h Male Formosa do 23 151 40 Do f do do do 21 145 46 Do k Female Hainan do 21 142 1 Do I do do do do 21 144 32 Do m Young do do do 21 144 39	Do	ŧ			.do	21	142	32
Do. sv Female do	Do	25	do		ob,	21	138	29
Do. h Male. Formosa. do. 23 151 40 Do. i do. do. 21 145 46 Do. k Female. Hainan. do. 21 142	Do	v			do	21	138	32
Do. 6 .do. .do. .21 145 46 Do. k Fernale .Hainan .do .21 142 Do. l do .do .21 144 32 Do m Young do .do .21 144 39	Do	107	Female .	do	do	21	143	31
Do	Do	h	Male	Formosa	do	23	151	40
Do do do do do 21 144 32 Do 88 Young do do do 21 144 39	Do	1	do	do,	.do	21	145	46
Do do 21 144 39	Do	k	Female	Hainan	do	21	142	
	Do	- 1	do	do	do	21	144	32
Do do do do 21 141 32	Do	110	Young .	. do.,	do	21	144	219
	Do	15	do	do	do	21	141	32

a Type of brericandus

Table III - Coast Province, Americand, west to Khingan Mountains.

				!	-	***
St. Peterah	2219	L'sauri	Strauch	23	163	36
Do	2221	. Cape Tyr	do	23	lei į	
Do	5535 [Possiet Bay	lı .	21	156	40
Do .	2233	Upper Amur	le	21	153	41
Do	2234	Komar	do	21	154	37
Do	2236	Amor .	10	21	151	47
Do	2237	Ann, Ussuri	lo	21	157	44
Do .	25334	Amur	da	21	151	49
Đo	2240	Bay Guerin	10	21	153	41
Do	2241	Adt. Annor	1)	21	154	41
Do	2242	Noor 1 ssuri	6.1	21	158	41
110 .	47.2%	Tschlanka Arc ir	4, 1	21	155	36
Do	37.23	Ussuri	.)	21	158	42
100	37.24	do	9.1	1	155	43
Brit Mus	< 5E₂s	le Khabarovka	Boreiger	237	155	40
Do.	et e	do do	1.	237	156	40
Do ,	r Fer	nule - Ussuri Reser	€ €	. 33	158	-39
		Verage			155-8	41

Table IV .- Khingan Mountains to East Turkestan

Museum	No. 8	ex and age.	Locality.	Authority.	Scale rows	Ventrals	Subcaudals.	Supralabials
St. Peterab	2216		Padun	Strauch	23	162	45	
Do, .	2217 .		. do	do!	23	164	39	
Do	2218		Nikolski Zavod	do	23	161	43	
Do	2222		Khingen	do,	23	157	42	
Do., ,	2223		Daurian Steppes	do	23	163	32	
Do	2224		Tarei Noor	do	23	167	41	
Do	2226	(Argun River,	., .do,	25	160	43	
Do	3719		Bukukun	do,	23	163	40	
Do	3720		Khingan	do	23	161	37	
Do	2235 .		Argus	do	21	160	42	***
Do	2239		Unt Stricka	do	21	154	46	1
Do	2243		Gobl	do	21	347	51	٠
Do	3721		Khingan '	,do,	21	155	49	
Do			Ordon	do	23	179	44	7-6
Do	**		do	do	23	169	42	8
Do.,			Ala-shan Governm	do	21	163	48	8
Do	'		do	do.,,,	21	168	37	7
Stockholm	1806 ; Pa	emale	Altai	Stejneger	25	172	43	8
Do			do	do	21	175	51	7-8
Do	1808 P	emale	, . do	do,	23	163	47	8
Do.	1909	do .	.do .	do	23	171	46	7-8
Do.	1810 M	ale	do	. do	23	161	53	8
Do.	1811	do		do	23	166	47	7
Do.			Southern Mongolia	Méheli	23	163	37	
Do.			do	do	23	170	43	
Brit. Mus.		aligr	East Turkestan	Boulenger	23*	161	49	
Do.			Smeinogorsk	do	23*	166	45	
Do.	, .	alfgr	Lob Nor	do , ,	237	157	42	
Do.	g	.do	.do	da .	23?	164	44	* *
			Average			163 5	43 1	ļ

TABLE V "Japan" Goschkewitsch, 1861.

						*			 			1
St	Petersb	2225		"Japan	1 ("c		- 1	Strauch.	23	162	38	l
	Do.	2227		.do		 		. do.,	 21	153	42	
	D ₀ .	2228		.do				do .	 21	157	42	
	Do.	2229		do				.do .	 21	157	41	
	Do.	2230		do				do,	 21	153	47	
				A	verage				 	156.4	42.0	1
_		1			_				 <u></u>			1

It may now be regarded as demonstrated that the only form found in the islands of Japan proper is Agkistrodon blomhoffii which, so far as the accessible material and records go, is the best differentiated form.

The Korean and Chinese forms differ only in the fewer subcaudals. There is no absolutely sharp line between the two forms inasmuch as 44

Yet, of the 36 specimens enumerated, only one (Brit. Mus. No. or less than 3 per cent would be unidentifiable by that test. averages 49 and 35.3 are much more significant, and it is scarcely to doubted that we have to do with a form which it will be advantage to recognize by name.

Contiguous to this South Chinese and Korean form we have another occupying the mainland to the north and northwest. chief characteristic consists in the greater number of ventrals, wh in 36 specimens vary between [147] 151-170 (average 158.4). addition numerous specimens have eight supralabials and about o half 23 scale rows instead of 21. With regard to the latter charac it is possible to divide the localities of these specimens into two class the great majority of them occupying the territory east of the Kh gan Mountains having 21 scales, those farther west 23. The perce age of exceptions in each group, namely, respectively 29 and 24 cent -is too great to make it advantageous to recognize two for Unfortunately, the published records do not indicate whether number of supralabials is more constant. For the present at le they must be united under the name of A. blomhoffii intermedius term consequently somewhat more comprehensive than Strauc original A. intermedius.

We have thus three, or possibly four, local forms which may be recalled by the following key:

- a¹. Ventrals 151, or less.
 - b^1 . Subcaudals 44, or more.
 - c. Underside black, more or less blotched with whitish....... blomhofii, p. .
 - c. Underside whitish, sprinkled with blackish blowhoghe? aglinis, p. .

The most interesting conclusion to be drawn from the above is the typical Japanese form is least closely related to the northern intermedius, which occurs on the opposite side of the Sea of Japanese and that their connection is only effected through the shorttail southern Chinese form, a conception entirely different from the connective held, according to which there were two distinct specific both occurring on either side of the Sea of Japan. The latter wou involve a previous northern line of intercommunication between two territories, while now it is seen that the connection between these forms lies toward the south.

alt would appear that the number may exceptionally reach 50 which is the manum noted by Doctor Werner for some specimens from Hankow. I will here again attention to the fact that possibly some of Doctor Haberer's specimens alleged to he been collected at Hankow in reality may be from Japan where he also collected. (a under Elaphe climacophoca, p. 326; quadricogata, p. 331; and conspecillata, p. 336.)



AGKISTRODON BLOMHOFFIL FROM TEMMINOK AND SCHLEGEL
FOR EXPLANATION OF PLATE SEE PAGE 555.



AGKISTRODON BLOMHOFFII a (Boie).

MAMUSHI.

Plate XXVI.

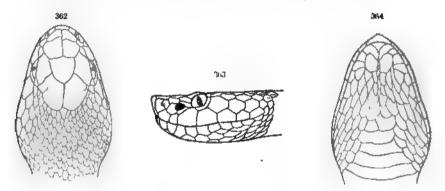
- 1826. Trigonocephalus blomhoffii Boie, Isis, 1826. p. 214 (type-locality, Japan; Blomhoff, collector); Bijdr. Natuurk. Wetensch., II, Pt. 1, 1827, p. 268.— TEMMINCK and Schlegel, Fauna Jap., Rept., 1837, pp. 88, 96, 139; Ophid., pl. vib (Kiusiu; Hondo). – Duméril and Bibron, Erpét. Gén., VII, Pt. 2, 1854, p. 1496 (Japan).—Bleeker. Natuurk, Tijdschr. Nederland. Indië, XVI, 1858. p. 204 (Japan).- Strauch, Mém. Acad. Sci. St. Pétersb. (7), XXI, No. 4, 1873, pp. 251, 282 (part: spm. No. 2231: Japan, Maximowitch, collector).— Hilgenborf, Mitth. Deutsch. Ges. Ost-Asiens, I. heft 10, July 1876, p. 30 (Tokyo).—Eastlake, Trans. Asiat. Soc. Japan. XIII, 1885, p. 72 (Japan); Nature, XXXI, April, 1885, р. 587.— Окара, Cat. Vert. Japan, 1891, р. 69 (Kaga; Kyoto; Tokyo; Awa, Hondo; Hachijo shima; Echigo; Awaji; Yezo; Toza).—Halys blomhoffii Guenther, Rept. Brit. India, 1864, p. 393 (part: Japan).— Hilgenborf, Sitz. Ber. Ges. Naturf. Fr. Berlin, 1880, p. 117 (Tokyo).— Ancistrodon blomhoffii Boulenger, Cat. Snakes Brit. Mus., III, 1896, p. 525 (part: Yokohama; Tsushima).—Wall Proc. Zool. Soc. London, 1903, p. 102 (part: Japan); 1905, II, p. 514 (Hondo; Yezo; Tanega I.; Yaku I.).
- 1837. Trigonocephalus blomhoffi Schlegel, Phys. Serp., II, p. 552 (Japan).— Fritze, Mitth. Deutsch. Ges. Ost-Asiens, V., heft 46, 1891, p. 238 (Yezo).— Ancistrodon blomhoffi Boettger, Kat. Schl. Mus. Senckenberg., 1898, p. 137 (Hondo; Yezo).—Schnee, Zool. Garten, XLI, 1900, p. 395 (color description from life).
- 1859. Trigonocephalus blomhoffii var. megaspilus Cope, Proc. Phila. Acad., 1859, p. 336 (type-locality, unknown; type in Phila. Acad. Mus.; collected by the Perry Expedition).
- 1862. Halys bloomhoffii Peters, Mon. Ber. Berlin Akad. Wiss., 1862, p. 671 (lapsus).

Description. Adult male; U.S.N.M. No. 31867; Kochi, province of Toza, Shikoku, May, 1903; Dr. Hugh M. Smith, collector (figs. 362-364). Rostral as high as broad scarcely visible from above; internasals small, subtriangular, their suture half that between prefrontals which are broadly in contact with supraoculars; frontal slightly longer than broad, as long as its distance from rostral and as interparietal suture, nearly straight in front; supraoculars longer than frontal and nearly as broad at the center of eye; parietals as long as supraoculars, longer than distance of frontal from tip of snout; nostril roundish in the posterior edge of the anterior nasal which is twice as large as the posterior; two loreals one above the other, the lower one bordering the pit anteriorly; a narrow subfoveal bordering the pit below posteriorly, not reaching the eye; two preoculars, of which the lower borders the pits above posteriorly; pit nearer eye than nostril; two postoculars, of which the lower is long, narrow, and

^{*}Blomhoff was director of the Dutch factory on Decima for more than ten years during the early part of the nineteenth century. His collections were brought to Batavia, where H. Boie described the reptiles and batrachians.

Paperoduced in this work on Plate XXVI.

crescentic, nearly reaching the lower preocular below the eye and separating the latter from fourth supralabial; 2+4 temporals, of which the lower ones in each row are large hexagonal flat shields, those above being small scales, keeled on the row nearest the parietals: the lower temporal of the third row large and shaped like those in front of it; these three lower temporals form a series of large shields larger than the adjoining labials; 7 supralabials, second smallest, third and fourth largest, and those behind gradually decreasing in size, third just entering eye; five lower labials in contact with anterior chin-shields, which are much larger than the second pair, the latter being scarcely differentiated from the scales behind and between them; 21 rows of strongly keeled scales with a pair of apical pits; 142 ventrals; anal undivided; 45 subcaudals, all divided. Color (in alcohol) above brownish gray with a series of large, rhomboid, darker



Figs. 362-364—Agkistrodon blomhoffil. $14 \times NAT$ size. 862, top of head. 363, side. of head; 364, enderside of head. No.~34867, 1° S.N.M.

brown, black-edged blotches on each side close to the median dorsal line, alternating, often confluent, descending on the sides to the outer scale row, separated by a narrow paler grayish band the edges of which nearest the black margin of the dark blotches incline to whitish; top of head of lighter brown, with a dark irregular marking on each shield; a sharply marked blackish brown stripe on lower preocular through eye where it widens to a very broad band on the temples, passing across the last supralabial at the corner of the mouth, the sharp edges of this band emphasized by a narrow white line above and below, the one below having a small sharply defined white spot on the anterior angle of the long crescentic lower postocular; underside irregularly mottled with whitish and blackish in about equal proportions: tip of tail brownish white.

###. Total length . 513 Shout to vent . 438 Vent to typ of tail . 75

The young have clearer, brighter colors, more contrasting pattern, and the tail always light colored toward the tip both above and below.

Variation. The most obvious instability in the scale formula is the varying number of temporals, but this variability is only confined to the upper scales near the parietals. As a matter of fact the outer edges of the later shields seem to be on the verge of breaking up into small scales as evidenced by the many nicks and half-finished sutures on their outer margins. The prefrontals also show sign of breaking up, and there is a distinct regularity in this process. In nearly all the specimens the inner anterior corner of these shields is more or less convex, and in a number of cases this slightly elevated region is cut off by regular sutures so as to form an additional anterior pair of prefrontals adjoining the internasals. Such is the adult female, No. 34043, from Yokohama. Quite similar in this respect is the adult female No. 15421, from Omachi, province of Shinshiu, and what is even more interesting, no less than three of her five young just born have these accessory prefrontals exactly like the mother, while only two of them are normal.

The number of supralabials, 7, is remarkably constant. Less so is the number of scale-rows, namely, 21, but 23 is rather of rare occurrence. The ventrals range between 132 and 146; subcaudals between 44 and 56 pairs.

The coloration is very variable. While specimens lighter than the one described above do occur, individuals much darker seem to be more frequent, and it is not uncommon to find specimens with the whole underside uniformly black or nearly so. While the tip of the tail seems to be always light yellowish in the young I find among the adults before me an even proportion of specimens with dark and light tail ends, there being apparently no distinction as to sex or locality.

The specimen from Hachijo shima (U.S.N.M. No. 36540), the southernmost island of the Idzu group, kindly submitted to me by Doctor Ijma, differs greatly in coloration from the normal specimens. The ground color is of a rich reddish brown with nearly all traces of blackish gone. In all other respects the specimen seems to be normal. Doctor Ijima writes me that he has six more specimens from the same locality of a similar coloration, but adds that the Science College Museum also has a specimen (No. 58) from the same island of a dark color similar to those from Hondo. In view of this fact I refrain from imposing any systematic name on this color variety.

Habitat. As here understood A blomboffi is restricted to the islands of Japan, being represented on the mainland opposite by closely allied forms, in Korea by A blomboffi brevicaudus, in the

Russian Coast Province by A blowhoffii intermedius.

The mamushi occurs more or less frequently on the four principal islands. Eastlake says that it "is most frequent in the neighborhood of Kyoto, also the environs of Yokohama and the Hakone Mountains; tolerably frequent in the north." In Yezo it was observed by Doctor Fritze on the road to Kamigawa in the neighborhood of Sorachi-buto, and the United States National Museum, thanks to the kindness of Doctor Nozawa, has a specimen, which probably came from near Sapporo.

It seems to be common in the seven islands of Idzu, at least on Hachijo shima, from which island the Science College has six specimens, the majority of an unusual bright reddish color.

Doctor Wall records two specimens from the islands south of Kiusiu, namely, one from Yaku shima and one from Tanega: hima, the former with 143, the latter with 142 ventrals, and both with 23 scale rows.

Holst collected specimens on Tsu-shima, which are now in British Museum.

List	of s	viccimens.	of	Agkistrodon	blomhoffii.
47641	.,, "	***************************************	•••	TIGHTON	vermentaget.

U.S. N.M. No.	Sex and age.	Locality.	When collected.	By whom collected.	Scale rows.	Ventruls.	Anal.	Subcaudals.	Oculars.	Temporals.	Supralablata.
			1882.						•		
15421	Femalea.	Omachi, Shinshiu	Oct.	P. L. Jouy	21	143	1	48	2,2	2+4	7
15422	Youngh.	do	do	do	21	142	1	48	2,2	2 + 3	7
15423	do.b	do	do	do	21	132	1	47	2,2	2+4	7
15424	\dots do. b	do	do	do	21	144	1	49	2,2	3+4	7
15425	\dots do. $^{\circ}$	do	do	$\dotsdo\dots\dots\dots$	21	139	1,	53	2, 2	2+4	7
15426	do.c	do	do	$\dotsdo\dots\dots$	21	141	1,	54	2, 2	3 + 4	7
17847	· · · · · · · · · · · · · · · · · · ·	Japan		H. Loomis	21				· · · ·	• • • • • •	7
23436	Half gr	Yezo	· • • • • • • • • • • • • • • • • • • •	S. Nozawa	21	143	1	52	2,2	2+3-4	7
		•	1903,		1		1		! :	i	
31866	Female.	Kochi, Shikoku	-	Dr. H. M. Smith	211	140	1	47	2, 2	*2+4	7
31867	Male,d, '	do	do 1902.	do.,,	21	142	1	45	2.2	2+4	7
34023	Female	Yokohama	June 20	A. Owston	21	140	1	4 9,	2,2	2+3	7
24024	Male.	do	.do 1894.	do.,	21	144	1	56	2.2	2+4	7
34040	Female	do	Aug 1901,	do	23	137	1	4 5	2,2	2+3-4	7
34041	Male	do	July 24 1902,	do	21	141	1	55	2,2	2+4	7
			11971.		- 1			i			
34043	Female ^c ,	do	Vug. 1887.	do	21	143	l	47	2,23	2-3+4	7
36540	do	Hachijo shima	May	N. Okada,	21	139	1	46	2,2	2+3	7

a 2 pairs of prefrontals

^{*}Yours tol. (542), 2 pairs of prefrontals.

Young of 15421

d Description, p. 457; figs. 302-364.

¹² pairs of prefrontals.

AGKISTRODON BLOMHOFFII ?AFFINISa (Gray).

1849. ? Trigonocephalus affinis Gray, Cat. Sn. Brit. Mus., p. 14 (type-locality unknown; type in Brit. Mus.; Capt. Sir Edward Belcher, collector).

Allusion has already been made (p. 451) to two specimens from Yaeyama, in the United States National Museum, which in every respect except color agree with the specimens from Japan proper. As there stated their ground color (in alcohol) is a "tawny-olive," uniform on top of head, but indistinctly varied and marbled on back and sides with blackish, and with indications of pale cross bands; a band slightly darker than the ground color through eye and temples; lips whitish, as is also the whole underside, each ventral sprinkled with irregular blackish brown dots and spots on the basal half.

I venture to suggest that the type specimen of Gray's Trigono-cephalus affinis in British Museum may belong to this form. At least his brief description seems to justify such a suggestion. The specimen has no locality attached to it, but it was presented to the museum by Capt. Sir Edward Belcher. As noted later under Trimeresurus elegans (p. 471,) Belcher surveyed and collected on Ishigaki shima, in the Yaeyama group for three weeks, and there is consequently a possibility that the type of Trigonocephalus affinis came from that island. Under these circumstances I adopt Gray's name provisionally and with the necessary reservation.

Finally I wish to call attention to specimen d in Boulenger's enumeration of the specimens of A. blomhoffii in the British Museum.^b It is a female with 142 ventrals and 43 subcaudals, presented by Mr. M. K. Rokugo, and said to have been collected in "Okinawa, Loo Choo Islands." Nobody else has recorded the mamushi from the middle group or Okinawa shima proper, and it is therefore rather probable that the specimen in question came from some other locality, possibly from the southern group.

It is not in the least probable that the Yaeyama Agkistrodon is directly connected, in a genetic sense, with the typical A. blomhoffii in Japan. It seems much more likely that the former is a slight modification of the Formosan stock which has developed in the same direction as the Japanese form, viz, toward an increased number of subcaudals, assuming at the same time a peculiar pale coloration. As a slight indication of their relationship with the mainland form rather than with the one from Japan, I may mention the absence of the white spot on the anterior corner of the long lower postocular.

As previously intimated, the Yaeyama specimens are mainly distinguished from the typical A. blomhoffii by the coloration and a detailed description of the lepidosis is therefore unnecessary. I wish, however, to call attention to a peculiarity in their scutellation (fig. 365),

Cat. Sn. Brit. Mus., III, p. 526.

which may or may not indicate a real difference. This feature of sists in the consolidation of the two scales above the large lot temporals of the second and third rows into a single elongate showhich is in contact anteriorly with the large lower shield of the row without extending above it; at the same time the two loss shields of the second and third rows are reduced in size and to upper edges form a straight line parallel with the edge of the The arrangement does not appear abnormal and is absolutely idea cal in both specimens, though in No. 34039 it is only found on right side, while on the left it is as in typical A. blomhoffii.

Color description.—Adult male; U.S.N.M., No. 34038; Yaeya Riu Kiu Archipelago; October 12, 1900; A. Owston collect

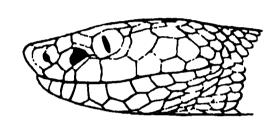


Fig. 365.—Agkistrodon blomhoffii? Affinis. 14 × nat. size. side of head. No. 34038, U.S.N.M.

The predominating color (in alcohol) above a pale drab, with very faint indication slightly browner cross-bars with trace darker gray edges, the cross-bars separately by narrow slightly paler interspaces; on outer row of scales and the adjoining color of the ventrals a series of irregular cinnant colored spots about 2-3 ventrals apart; he

uniform, the temporal region darker, especially on the upper bor of the adjoining supralabials on which the contrast with the pale coff the rest of these shields is fairly well contrasted; only faint transfer of a whitish line above and below the dusky area on the temporagion; lower postocular uniform drab without anterior white spunderside whitish with slight and irregular dark gray markings at base and outer corner of the ventrals.

Dimensions.								
	mm.							
Total length	404							
Shout to vent	340							
The same of the standing of the same of th								

Variation.— No. 34039 differs chiefly in being still paler and no cinnamon-colored with even less traces of a pattern on the upside and on sides of head; on the other hand, the dark gray maings on the underside are distinctly darker but not larger.

The difference in the scutellation of the temporal region on two sides of this specimen has been alluded to above.

Habitat.— Uncertain as the whole status of this form is, the estatement which can be made with certainty refers to the two species in the U.S. National Museum, which were collected Octo 12, 1900, on Yaeyama, according to Mr. A. Owston.

Whether it occurs on any of the other islands it is impossible say now, but it appears probable that it is confined to the south group of the Riu Kiu Archipelago.

List of specimens of Agkustrodon blomhoffix 7 affinis.

l' S N.M No.	Sex.	Locality.	When collected	By whom collected or from whom received.	Scale rows.	Ventrals.	Anal.	Submudala.	Ocudars.	Temporals.	Supralahiala,
			1900.								
34034	Males.	Yacyama, Riu Kiu	Oct 12	A Owston	21	139	1.	49	2,21	2 + 4	7
34039	do	do	40	do	21	138	- 1	58	2, 2.2	+3 4	7
						. '		ا			_

Description, p. 462; fig. 365

AGKISTRODON BLOMHOFFII BREVICAUDUSa, new subspecies.

1856. Trigonocephalus blomhoffii Hallowell, Proc. Phila. Acad., 1856, p. 153 (Ningpo, China) (not of Boie, 1826).—Halys blomhoffii Guenther, Rept. Brit. India, 1864, p. 393 (part Formosa)—Swinhoe, Proc. Zool Soc. London, 1870, p. 412 (Ichang, China).—Giglioli and Salvadori, Proc. Zool Soc London, 1887, p. 594 (part. Fusan, Korea)—Ancistrodon blomhoffi Boulenger, Cat. Snakes Brit. Mus., III, 1896, p. 525 (part. Formosa; Hainan, Chekiang, Ichang, Mts. north of Kiukiang, China). Wall, Proc. Zool. Soc. London, 1903, p. 98 (part. Shanghai; Yangtse Valley).—Werner, Abh Bayer, Akad Wiss. (Muenchen), II Klasse, XXII, Pt. 2, 1904, p. 357 (Ningpo Mts. and Hankow, China).—Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg, (8) XVII, no. 1, 1905, p. 329 (part. Korea)

1863. Halys blomhoff: Swinhoe, Ann. Mag. Nat. Hist. (3), XII, 1863, p. 225 (Tamsui, Formosa) - Boettroer, Offenbach, Ver. Naturk, 26-28 Ber., 1888, p. 153 (part: China).

Diagnosis. Similar to Agkistrodon blomhoffii, but number of sub-caudals averages only 35 (known mimimum 29, known maximum 46); scale rows 21, rarely (about 10 per cent) 23; supralabials 7, very rarely (about 2½ per cent) 8; ventrals 138-151.

Dimensions of type specimen (adult male).									
			.,	•					78 /8.
Total length				,					595
Snout to vent	-								532
Vent to tip of tail									63

Type, U.S.N.M. No. 17507; Fusan, Korea; 1885; P. L. Jouy, collector.

Remarks.—This form is so much like typical Agkistrodon blomhoffii, from Japan, that no detailed description is deemed necessary. Of the four adult Korean specimens before me, three have uniform black belly. If this series can be trusted the dark postorbital band descends slightly farther down on the supralabials than in Japanese specimens. All lack the white spot at the anterior angle of the crescentic lower postocular.

Habitat. - Eastern China, Korea, and Formosa.

Our knowledge of the distribution of this form is very defective. In China it has thus far been in the eastern part, although

apparently always some distance back from the coast; for instance, at Ningpo, Ichang, Chekiang, Kiukiang, etc. It seems probable that it is confined to the more mountainous districts without coming down on the alluvial plains. Four specimens said to be from Hoi How, island of Hainan, were presented by J. Neumann to the British Museum. This locality needs corroboration a (see pp. 326, 331 and 336). In Korea it has been collected both at Seoul and Fusan by the late P. L. Jouy.

Two male specimens from Formosa collected by Swinhoe are in the British Museum.

Museum. No. Sex and age.	Locality.	Vhen col- ceted	By whom ecl- lected.	Scule rows.	Ventrals.	Anal.	Sulvaudals.	Oculars.	Temporals.	Supralablala.
U.S.N.M. 14612 Male I Do 14613 Female Do 17507 Male a I Do 17508do S Mich. Univ. 30525 Young b	usan, Korea	 1885 1883 .	do P. L. Jouy do	21 ¹ 21 21	148 146	1 1	37 2 31 2		2+3-4 2+4 2+4	1 7 1 7

a Type; p. 463.

b Total length, 335 mm.

AGKISTRODON BLOMHOFFII INTERMEDIUS b (Strauch).

1859. Trigonocephalus blomhoffii Мааск, Putesh, na Amur (p. 152) (Amurland) (not of Boie); Putesh, na Ussuri, 1861 (p. 190) (valley of the Ussuri),— Strauch, Trudi Perv. Siezda Russkikh Yestesty., Zool., 1868 (p. 296); Mém. Acad. Sei, St. Pétersb. (7), XXI, no. 4, 1873, pp. 251, 282 (Ussuri and Amurland; Possiet Bay and Vladivostok; De Castries Bay); in Przevalski's Mongoliya i Strana Tangutov, III, 1876, p. 52 (Ala-shan Government),—Gigliott and Salvadori, Proc. Zool. Soc. London, 1887, p. 594 (part: Olga Bay, Russ. Coast Prov.).— Ancistrodon blomhoffii Boulenger, Ann. Mag. Nat. Hist. (6), V, Feb. 1890, p. 140 (Amurland; Ussuri).— Хікоlsкі, Zap. Ітф. Akad. Nauk, S. Peterburg, (8) XVII, no. 1, 1905, p. 329 (Amurl.; Ussuri, etc.)

1868. Trigonocephalus intermedias Strauch, Trudi Perv. Siezda Russkikh Yestesty., Zool., (p. 294); Mém. Acad. Sci. St. Petersb. (7), XXI, no. 4, 1873, pp. 245, 282 (type-locality, Governm. Irkutsk, East Siberia; types in St. Petersb. Acad.); in Przewalski's Mongoliya i Strana Tangutov, III, 1876, p. 52 (Ordos). Halys intermedia Peters. Mon. Ber. Berlin Akad. Wiss., 1877, p. 735 (Smeinogorsk, Tomsk Governm.). - Halys intermedias Boettger, Offenbach. Ver. Naturk. 26–28 Ber., 1888, p. 153 (Nan-shan, near Kuku-nor, south. Gobi; Ala-shan Desert, Prov. Ordos; Russ. Turkestan; east. Siberia). - Ancistrodon intermedias Boulenger, Ann. Mag. Nat. Hist. (6), V. Feb. 1890, p. 140 (Kunges, east. Turkestan;

a Bocourt (Nouv. Arch. Mus. Paris, II, 1866, Bull., p. 9), in a list of the reptiles brought home by him from the southern provinces of Siam, mentions "Trigonocephalus blomhoflii." Locality and identification need corroboration.

b Signifying intermediate, i. e., in characters between A. blomhoffic and A. halys.

Smeinogorsk; Khabarovka, Ussuri); Cat. Sn. Brit. Mus., III, 1896, p. 525 (Tarim Riv, Lob Nor) —MÉHELY, Zichy's Dritte Asiat. Forschungsr., II, 1902, p. 58 (Southern Mongolia: Chalute; Chere-muchor). —Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg, (8) XVII, no. 1, 1905, p. 326 (Amurland, Ussuri, etc.).

No specimen of this form is available for detailed description, which, moreover, seems to be unnecessary, as the chief difference is believed to consist in the greater number of ventrals and greater average of scale rows and supralabials, features previously discussed (pp. 450-456).

Habitat. -This form has a wide distribution from the Gulf of Tartary and the Sea of Japan, in the East, through southern Siberia and Mongolia to the Government of Tomsk and eastern Turkestan, in the West consequently extending over more than 50 degrees of longitude. At its eastern boundary it has been found as far north as Cape Tyr (above Nikolayevsk), on the Amur, and Decasties Bay, on the Gulf of Tartary. On the west shore of the Sea of Japan it goes southward at least to Possiet Bay. It seems to be common all over the Ussuri and Amur country, as well as along the coast, where, in addition to the localities already mentioned, it has been collected at Vladivostok and Olga Bay.

List of specimens of Agkistrodon blomhoffic intermedius.

Stock- holm Mus. No	Sca	Locality	When col- lected	By whom col- lected	Sculo rows.	Ventrala	, tru,	Subraudala	Oculaes.	Temporals.	Supralabials
1906	Female	Altal Siberia	1875	Slowzoff	25	172	i	43	2,2	2+4	8
1807	Male	lo .	1875	do	21	175	- 1	51	2,2	2+3	7.8
1908	Female	do	1475	do	23	163	1	47	2,2	2+3	B
1809	do	do	1879	do	23	171	1	46	2,2	2+3	7-8
1810	Male.	do	1875	.do	23	161	1	53	2,2	2+3	8
1811	do	dn ,	1975	. do	23	166	Į.	47	2,2	2+3	; 7

Genus TRIMERESURUS, Lacépède.

- 1804 Trimeresurus Lacépède, Ann. Mus. d'Hist. Nat. Paris, IV, p. 209 (type, T viridis)
- 1822. Trimercsura Fleming, Philos Zool., II, p. 291 (emendation).
- 1830. Megæra Wagler, Syst. Amph., p. 174 (type, Vipera trigonocephala).
- 1830 Atropos Wagler, Syst. Amph., p. 175 (type, Trigonocephalus puniceus) (not of Oken. 1815).
- 1830. Tropulolæmus Wagler, Syst. Amph., p. 175 (type, Cophias wegleri).
- 1839. Trimenurus Swainson, Classif. Fish Amph. Rept., H (Lardner's Cab. Encycl.), p. 363 (emendation).
- 1843 Botrophis Fitzinger, Syst. Rept., p. 28 (type, T. viridis).

a From τριμερής, divided into three parts; οὐρά, tail.

The snakes of this genus are distinguished from Agkistrodon the first glance by the absence of the regular shields on top of the head, which are here replaced by scales more or less similar to the of the body.

It has not been demonstrated conclusively that they are genically identical with the numerous American pit-vipers of a similar head scutellation, and which are usually known as *Trigonocepha* or *Bothrops*. The South American genus *Lachesis* is sufficient characterized by the peculiar scutellation of the tail.

It is not even certain that all the snakes here enumerated as T meresurus really belong to the same genus. There are various in cations that T. gramineus represents a group of species which mig profitably be separated from the others. As a matter of fact, un the cranial structure of all the various forms which make up to bulk of the Crotalidæ is known, generic combinations must be venuertain in this family.

KEY TO THE SPECIES OF TRIMERESURUS OCCURRING IN FORMOSA AND THE RIU KI

- a¹ A squarish loreal shield between nasal and upper preocular; nasal divided or sendivided; tail normal; color brownish.
 - b^{\pm} A single elongate subocular; more than 175 ventrals; more than 65 subcauda c^{\pm} Less than 30 scale rows.

The five forms here recognized occur within our territory only Formosa and the Riu Kiu Archipelago. T. gramineus extends fro the eastern Himalayas to Formosa, but has not as yet been found the islands to the northeast of the latter. It represents a group species not very closely allied to the other four. These fall aga into two well-defined groups, viz, T. okinavensis on the one han and T. mucrosquamatus, elegans, and flavoriridis on the other. T last three are plainly of common origin, and T. mucrosquamatus, whi is supposed to occur in Assam as well as in Formosa, may cons quently be regarded as the mother species, a T. elegans having develope from it on the southern group of the Riu Kius by a decrease in t number of scales and scutes, while T. flavoriridis which became is lated in the middle and northern groups developed in the other dire tion, viz, by an increase in scale rows. T. okinavensis, finally, h thus far only been found in the central and northern groups, as no near relative is known either from the southern Riu Kius or fro

^a See pp. 467-468 for a discussion of this species and its relation to T. jerdon**

Formosa. Nevertheless, it is possible to trace the origin of this form also to the eastern Himalayan region, as its nearest and apparently quite close relative is T. monticola which ascends to 8,000 feet in the Himalayas and extends east into China at least as far as the province of Szechuen. That this species, or closely allied forms, have not as yet been found in Formosa and the intervening territory is not so surprising when we consider how little we know of the fauna of this region, and I have but little doubt that such a link connecting the habitat of T. monticola and T. okinuvensis will be discovered some day.

Reverting to the T. mucrosquamatus-elegans-flavoviridis group, it is evident that while T. elegans is geographically intermediate it is not so located systematically and phylogenetically, but that this form and T. flavoviridis have developed independently and in several respects in opposite directions from T. mucrosquamatus—in other words, that in extending eastward and northward after having reached Formosa, the ancestor of T. flavoviridis did not invade the central Riu Kiu group (Okinawa-Oshima) by way of the southern (Yaeyama) group. The difference in the geological structure of these two groups, as demonstrated by Doctor Yoshiwara recently, probably accounts for this apparent incongruity, as their connection with Formosa may have occurred at different geological periods.

TRIMERESURUS MUCROSQUAMATUS (Cantor).

1839. "Trigonocephalus mucosquamatus Canton Proc Zool Soc. London, 1839, p. 32 type-locality, Naga Hills, Assam Trimeresurus mucrosquamatus Guentuer Rept Brit L. La 1864 p. 390 (type-lost)

1870, Transcensus macrosquamatus Swinhoe, Proc. Zool Soc London, 1870, p. 411, pl. xxxi. Foracsa). Fischer, Abb. Naturw. Ver. Hamburg IX, 1886. No. 6, p. 18. South Formosa), Jahrb. Wiss. Anst. Hamburg, V. 1888, p. 21. (South Formosa). Bottenger, Fauna Brit. India, Rept., 1890, p. 425. (Assam, Formosa). Steineger, John Sci. Coll. Tokyo. XII, Pt. 3. 1898. p. 225. Taipa. Formosa. Lachesis macrosquamatics. Bottenger, Cat. Su. Brit. Mus., 141. 1896, p. 552. (Formosa). Wall, Proc. Zool. Soc. Lei, Ion., 1903. p. 99. (Formosa).

Cantor's original specimen which came from Naga Hills, Assam,^b has been tost, and no specimens from that locality have been recorded since. As the description is exceedingly brief it is consequently not absolutely certain that the Formosan specimens have been correctly identified as *T. mucrosquamatus*. However, the number of ventrals and subcaudals, respectively 218 and 91, agrees very well, and in view of the close relationship of many Formosan snakes with those

⁶ Signifying macro, a sharp point, squamatus, scaly hence, with pointed scales b Bostiger (Offenba, n. Ver. Naturk. 26-28. Ber. 1888, p. 153) suggests a confusion with Nata Hells. Okirawa shana in which case Cantor's time would antedate Halls. There is not the slightest probability, however, that sefore him.

of the Himalayan region it would be too rash to deny the poss bility of their identity.

Nevertheless, I wish to put on record my suspicion that the Nag Hills and the Formosa specimens represent separate local developments of Trimeresurus jerdonii of Guenther, also from Assam, but occurring all the way from Tibet to Ichang on the upper Yangtschiang. The scale formula of Cantor's specimen, the type of Interesquamatus, precludes its being identical with T. jerdoni but the latter comes pretty close to T. elegans, from the souther Riu Kius, with which it also agrees very well in coloration.

Description.—Adult male; Science College Museum, Tokyo, No. 6 Taipa, Formosa; October, 1897; T. Tada, collector. Rostral some what broader than high, barely visible from above; three sma scales behind the truncate upper edge of the rostral between th anterior nasals; six scales, including the turned-over upper anterio corner of anterior nasal, covering the canthus rostralis, the on adjoining the latter being clongate and largest; supraoculars rathe narrow, about one-third as wide as interocular space; 15 scales in a line between supraoculars; nostril in the posterior margin of the anterior nasal which is much larger than the posterior, its upper anterior corner being turned over on the canthus rostralis; two small loreals, one behind the other, on a line with and of the same width as the upper preocular; two long preoculars, of which the lower is much narrower than the upper, but as long as the latter and posterior loreal together, and forming the upper edge of the pit three postoculars, including a long, narrow, crescentic subocular which anteriorly is separated by one scale from the subfoveal shield subocular separated from third supralabial by one scale and from fourth by two series of scales; temporals numerous, the upper smaller, scale-like, convex, the lower somewhat larger, flat; 9 supralabials (on left side only 8 by fusion of fifth and sixth), second forming the anterior border of pit, and with third, fourth, and fifth the largest supralabials, sixth to tenth suddenly much smaller, not larger than the adjacent temporals; first supralabial which is separated from anterior loreal by two scales is of the same size as the last ones; two lower labials only in contact with anterior chinshields, third and following ones being separated from them by scales; posterior chin-shields scarcely differentiated and separated by a pair of scales; 27 rows of pointed scales, all strongly keeled and with two faint apical pores, except the outer one which is only feebly keeled at base; 206 ventrals; anal entire; 95 pairs of subcaudals. Color (in alcohol) above drab with a median series of

irregular transverse, dark brown, black-rimmed and very narrowly

^a Proc. Zool. Soc. London, 1875, p. 233, pl. xxxiv (type-locality, Khasi Hilk Assam; types in Brit. Mus.; Dr. T. C. Jerdon, collector).

white-edged spots, consisting of two halves, one on each side of median line and not always evenly joined, in which case sometimes a zigzag band is forming by connection with succeeding spots; directly under each dorsal spot a smaller lateral spot of the same color, these lateral spots disappearing on sides of neck and tail; top of head with a distinct pattern of dark brown lines diverging from snout backward and forming a lozenge-shaped figure on occiput in the center of which an elongate dark line; a narrow dark line from upper corner of the crescentic subocular over the temporal region to beyond the angle of mouth passing above it on the scale above the last supralabial; lips uniform pale; underside pale drab with several irregular series of large roundish, dark-edged whitish spots, often transversely oblong, and not extending over more than one shield.

Dimensions.

	110 110.
Total length	780
Snout to vent	
Vent to tip of tail	192

This snake undoubtedly grows to be more than 1 meter long.

The young (Sci. Coll. Mus. Tokyo, No. 18) is colored essentially as the adult, but the contrast between ground-color and the dark spots is greater, and on the former, between the latter, there is on the sides a shadowy pale brownish gray vertical line; the sides of head, including labials, are not pale, but dark brown, especially a broad vertical band on second supralabial, though not as dark as the postocular stripe which is bounded below by a whitish line and several of the labials and temporals are bordered behind by a narrow whitish mark.

Structurally the only difference from the adults consists in the upturned outer edge of the supraocular.

Variation.—The number of scale rows in this form is fairly constant, nine out of eleven specimens having 27 and only two 25 rows; in the same number of specimens the ventrals vary only between 200 and 216, and the subcaudals between 76 and 95. The supralabials are more variable, namely, 8 to 11. U.S.N.M. No. 36515 has 10 on each side, a small labial having been interpolated between third and fourth.

Habitat.—T. mucrosquamatus, as here understood, is only known with absolute certainty from Formosa, where it seems to be fairly common in the lowlands, since nearly all who have collected there obtained specimens. It is assumed that it is the same form which was originally described by Cantor, in 1839, from the Naga Hills in Assam, but it has not been collected there since that time, nor has it been found in the intermediate territory of the Chinese mainland.

It is unquestionably related, however, to a species which occurs rom Assam and Tibet as far east as Ichang on the Yangtse, viz,

tendency, however, to a less definite arrangement of light and dark spots on the underside and to a more or less complete obliteration of the lateral spots.

Description (figs. 366-368).—Young; Science College Museum, Tokyo, No. 19; Iriomote shima; 1887; Tashiro, collector. Rostral broader than high, barely visible from above, bordered behind by two scales which separate the anterior nasals, the latter not turned over the canthus rostralis to the upper surface of the snout; two larger scales on canthus rostralis, the anterior separated from the rostral and from the posterior one respectively by a small scale and the latter by a similar scale from the supraocular, the outer edges of these scales being raised like that of the supraoculars; upper head scales small, smooth, 13 in a row between supraoculars, which are somewhat more than one-third as wide as interorbital space; posterior nasal smaller than anterior, followed by a single squarish loreal, behind which an equally broad, elongate upper preocular; a second, much narrower and somewhat longer preocular forms the upper edge of the pit; three postoculars,



Figs. 306-368. Trimeresures elegans nat size. 306, top of head, 367, side of head, 368, underside of head. No. C 40, High School, Kumamoto.

including the long, narrow crescentic subocular which reaches the subfoveal, and is separated from fourth supralabial by two rows of scales; upper temporals weakly keeled, lower ones smooth, those bordering the supralabials larger than the latter; 7 supralabials, first small; secand forming the anterior border of the pit, third largest, fourth long, but perceptibly lower than third, and not much higher than those following, three lower labials in contact with anterior chin-shields, which are larger than the posterior ones, scales pointed, in 23 rows, all strongly keeled, except outer row which is smooth; 188 ventrals, anal entire; 72 pairs of subcaudals. Color (in alcohol) pale brownish gray above; a series of darker brownish blotches, with paler centers, along the middle of the back, the respective halves of each blotch on each side of the median line not always fitting together, but sometimes even completely alternating and thus forming in places an interrupted zigzag band, tip of tail uniform light-colored (yellow !), on the sides obscure traces of a dark spot below each dorsal blotch; a somewhat ill-defined

brownish band on top of head covering the two scale rows nearest to the supraoculars and extending backward to the neck; a well-defined dark-brown band or line, one scale wide, starting from the posterior margin of the orbit below the center of the eye and extending backward beyond the angle of the mouth passing the latter on the scale row above the last supralabial; a dark brown vertical line on the posterior half of the second supralabial from the pit to the edge of the lip, lower surface pale buff with ill-defined markings of pale brownish gray.

Dimensions.							
	mm.						
Total length	370						
Snout to vent	305						
Vent to tip of tail	65						

In the adult male from Ishigaki shima the coloration is essentially as described above, but the lateral series of spots, one below each dorsal blotch, is as well marked and dark colored as the latter; tip of tail is without dark cross-bars but is not paler than the basal portion. This specimen (Sci. Coll. Mus. Tokyo, No. 18) measures 655 mm. in total length, of which the tail is 123 mm. This is considerable less than the length reached by the species, as one of the types, according to Doctor Boettger, measures 945 mm.

The edge of the supraocular is turned up in all the specimens, but according to my observations on the specimens in the Hamburg Museum less so in the old specimens than in the young ones.

Variation.—The present species is rather variable so far as the scutellation of the head is concerned. In Boettger's types of T. luteus, which he kindly allowed me to examine in 1898, the scales covering the canthus rostralis are small and irregular. Of four specimens in the Hamburg Museum two have one large canthal scale followed by three small irregular ones, while two have two large scales followed by a small one, and of the three specimens before me two have one and one two enlarged canthal scales. In his types, the temporal scales are rather strongly keeled; in the Hamburg specimens three of the specimens have the upper temporals more or less strongly keeled, in the fourth one the keels are only faintly indicated, and so they are in my specimens. In one of the types of T. elegans the temporals are slightly, but distinctly keeled, as already stated. Usually there are two rows of scales between the subocular and the labials, in one Hamburg specimen (No. 2582) only one such row. The number of scales between the supraoculars varies between 10 and Supralabials probably most commonly 7, but one of my specimens has 8 on both sides, and two have 7 on one side, 8 on the other. In the specimen in the Kumamato Fifth Higher Middle School the long upper preocular is divided vertically near the eye on both sides.

Of 13 specimens eight have 25 scale rows and five have 23. Doctor Wall records one with 24 scale rows. Ventrals vary between 183 and 191, subcaudals between 66 and 77.

The variation in color seems to be less great and consists in the more or less perfect obliteration of the lateral series of spots, and in the greater or less definite outline of the light and dark spots on the underside.

Remarks by collector.—Mr. Tashiro has furnished the following note with the larger specimen collected by him on Ishigaki shima:

"This species is not found on Okinawa shima, but is confined to the Yaeyama Islands. It is known by the name of 'Habu,' the general name applied to the snakes of this genus, of which there are about five varieties, each with a special name. It lives in crevices in stonewalls, hollow trees, etc. Its habits are more sluggish than the real 'habu' (Trimeresurus flavoviridis). The natives say that it is less poisonous than the latter, yet I think it is by no means inferior in this respect."

Habitat.—This species is confined to the southern group of the Riu Kius, and seems to be fairly common both on Iriomote shima and on Ishigaki shima. Boettger's types of T. luteus are said to have come from "Yaeyama auf Mijako shima," a somewhat confusing statement which might have been suspected of meaning "Miyako shima of the Yaeyama group," as formerly at least that island was considered part of the group, though now excluded as a special subgroup, but in the introduction to his paper a Doctor Boettger says:

"Aber die Thiere scheinen leider nicht genau nach den Fundorten getrennt worden zu sein * * * Die Schlangen sollen zum grössten Theil von Yaeyama oder Patchungsan, einer der Miyako shima Inseln, herstammen."

But Patchungsan is the Chinese name for Ishigaki shima, and Doctor Boettger evidently uses Miyako shima as the collective name of the two southern subgroups. It is therefore exceedingly dubious if the types came from Miyako shima proper, and the probability is that they really originate from Ishigaki shima. That the same species occurs on Miyako shima has now been shown by Doctor Wall who records three specimens from that island under the name of Lachesis mucrosquamatus.

^a Offenbach, Ver. Naturk, 33-36 Ber., 1895, p. 101.

Last of a	peciniens	of	Trimicresurus	elegana
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T		- 1	٠.			_					_
Мимент	No.	Sex and age.	Locality	When col- lected.	By whom col- lected or from whom received	Scale rows	Ventrals	Altal	Aubennehrla	Internel stabs	Supraistly ds
Sel. Coll Tokyo.	19	Young .	Iriomote shi- ma.		Tashiro	23	188	h	72	13	7
Do			_		.do		193	1	72	12	В
Kumamoto		-	do				185	1	78	10	7
Hamburg			Irlomote shima	1	Doctor Lenz .		187	1	72	[]	7-8
Do	2578b	do	do	1997	do	25		b +			7-8
ĺ	- 1			1897							
Do	2582	Female .	.do	Mar.13	. do	23	191	1		- 11	7
Brit. Mus 47	3.4.64	Malob	[Ishigaki shi- 'ma"]		Capt. E. Beicher.	25	187	L	76		
Do47	3.4.62	Young b	do		.,do,	26	183	L	72		
Sencken-	9553a	Adult ¢.	"Miyako shi-		B. Schmacker .	23	182	1	721		
berg.			ma.")		- 1	12-13,	7.8
Do		do.e	do		do	25	185	1	74		
4 Descrip	ptlon,	p. 472	6 Types	of T. eleg	gans.	r T3	pes	of T	lute	kи,	

TRIMERESURUS FLAVOVIRIDIS a (Hallowell).

HABU.

Plate XXVII.

1860. Bothrops flavouridis Hallowell, Proc. Phila. Acad., 1860. p. 492 (typelocality, "Amakarima" Island = Kerama shima, middle group, Riu Kius) —Boulenger, Proc Zool. Soc. London, 1887, p. 149 ("Loo Choo" Islands) — Okada, Cat Vert. Japan, 1891, p. 70 (Okinawa shima),—? Fritze, Zool. Jahrb. Syst., VII, 1894, p. 860; author's separate, p. 11 (Okinawa) — Trimeresurus flavouridis Boulenger, Fauna Brit. India, Rept., 1890, p. 425 (Loo Choo) — Lachesis flavouridis Boulenger, Cat Sn. Brit. Mus., III, 1896, p. 550 (Okinawa) —Boettger, Kat Schl. Mus. Senckenberg, 1898, p. 139 (O-shima, "Liu Kiu gruppe") —Brown, Proc. Phila. Acad., 1902, June 11, p. 185 ("Loo Choo Islands") —Schenkel, Verl. Naturf. Ges. Basel, XIII, Pt. 1, —, p. 179 (Okinawa). Wall. Proc. Zool. Soc. London, 1903, p. 102 (Loo Choos); 1905, II, p. 516 (Amami, Okinawa).

1880. Trimeresurus riukinanus Hilgendorf, Sitz. Ber. Ges. Naturf. Fr. Berlin. 1880, p. 118 pl. —, figs. 6 10 b (type-locality, District Nase, O-shima; types, Nos. 9767-9768, Berlin Mus.).—Doederlein, Mitth. Deutsch. Ges. Ost-Asiens, HI, 1881, p. 149 (Amami-o-shima) —Landois, Westfal. Prov. Ver. 16 Ber., 1887 (p. 45). Fischer, Jahrb. Wiss. Anst. Hamburg, V, 1888, p. 20 (Okinawa shima).—Okada, Cat. Vert. Japan, 1891, p. 70 (Okinawa, O-shima).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 860; author's separate p. 11 (Amami-o-shima, Okinawa shima).

The type of Hallowell's Bothrops flavoviridis which, according to his statement, was much mutilated (only 61 ventrals could be counted)

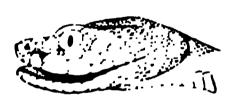
a Signifying yellowish green. b Reproduced in this work on Plate XXVII.

has apparently been lost. From Doctor Stimpson's MS. catalogue it is learned that the "viper," as he calls it, was "killed on one of the Amakirrima Isles (Loo Choo) by Mr. Macomb of the Hancock, April 1855," consequently on one of the small islands composing the Kerama shima group just west of the south end of Okinawa shima.

Hilgendorf's Trimeresurus riukiuanus on the other hand was described from specimens obtained in the Nase district on Amamio-shiina, the principal island of the northern group. The scale formulas of the specimens from both groups agree very well, and a direct comparison of a few specimens does not reveal any essential difference. The material at hand, viz. one from the northern group and two from the middle group, is not conclusive, however. The former seems to have a somewhat longer snout with more, or smaller, scales between the supraoculars, but until verified in large series from both groups the two names must be regarded as synonymous. The low number of scale-rows assigned to his specimen by Hallowell, viz, 31, is evidently due to the fact that the specimen was mutilated.

Okada in his List of the Vertebrates of Japan enumerated both T. flavoriridis and T. riukiuanus as separate species, though possibly he included the former with T. okinavensis which was not then described. Doctor Fritze, however, enumerates all three from Okinawa. Inasmuch as he seems actually to have examined specimens of two species it is probable that the one from Tokushimura was really a T. okinavensis although enumerated as a T. flavoriridis.

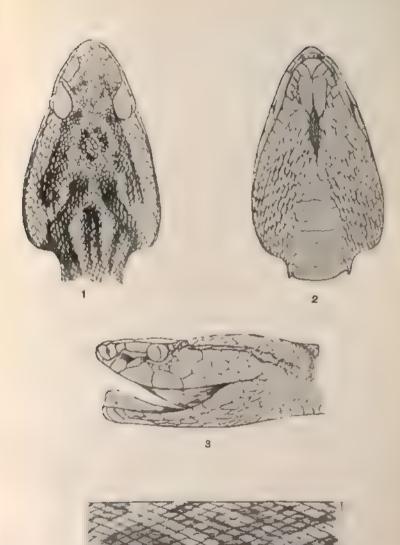
Description (fig. 369). Haltgrown female: U.S.N.M. No. 31818: Amami-o-shima, Riu Kiu; Dr. H. M. Smith collection. Rostral



146. 369. — Trimeresurus Havoviridis. Nat. 871. Side of Head. No. 46. Sci. Coll., Tokyo.

almost as high as broad, nearly triangular, the sutures with first supralabials and internasal being very short, just visible from above; a single small scale behind the rostral separating the anterior nostrils; four or five shields, including the anterior nostrils, forming the raised canthus rostralis between rostral and supraocular, the

shield second from the supraocular being the largest; supraocular long, pointed anteriorly, half as wide as interocular space; upper head scales smooth, small, about 13 in a line between the supraoculars; nostril round, in the posterior margin of the anterior nasal which is turned over the canthus rostralis to the upper side of the head; loreal nearly rectangular, slightly longer than high; two preoculars, very elongated, both in contact with loreal, the upper nearly twice as long as the latter, the lower, which forms the upper posterior border of the pit, much narrower than the upper; a long narrow shield bordering the pit below, separated from long subocular by a couple of small scales; eye rather large, vertical diameter equaling its distance from edge of lip; a very long narrow crescentic subocular



TRIMERESURUS FLAVOVIRIDIS. FROM HILGENDORF.)

FUR EXPLANATION OF PLATE SEE PAGE 555



separated from the lower precular and from the subfoveal by several small scales: from the fourth supralabial by two rows of scales, and from the temporals by a single row of smaller scales; one postocular on left side, three on right, in adition to suboculars; lower temporals large, upper ones small, smooth scales; 8 supralabials, first subtriangular, second forming the anterior border of the pit, third largest, fifth to eighth small, low, three lower labials in contact with anterior chin-shields, fourth and fifth being separated from them by scales; anterior pair of chin-shields much larger than posterior, which are scarcely differentiated from the other postgenerals and separated by a pair of smaller scales. 35 rows of narrow pointed scales, of which all except the outer are keeled and provided with two apical pits; 226 ventrals; anal undivided, tail defective, subcaudals 73 +, very few missing Color (in alcohol) above very pale isabella-color, on each side of the median line with a series of elongated darker brownish spots, which are nearly in pairs anteriorly but alternating on the posterior two-thirds, mostly anastomosing across the median line; on the sides a similar but very obscure series; on the upper side of the tail the spots become united to regular cross-bars; occiput with a very obscure pattern of several elongate divergent spots; sides of head whitish with a narrow brown line from upper corner of subocular across the temples to the sides of neck, one scale above last supralabial, all the brown markings are dark-edged with paler centers; underside uniform whitish.

Demensions	
·	12; (2)
Total length	612
Snort Covent	117
Vent to top of tail	0.7

This species grows to a considerable size. Hilgendorf's types of *Trinkonanus* are 1.380 and 1.555 m., and Doctor Fischer records two specimens measuring 1.433 and 1.285 m., respectively. A snake of this kind over 5 feet long must be a pretty dangerous reptile.

Variation. The number of scale rows shows considerable variation, viz, from 33 to 37, though 35 seems to be the normal number, inasmuch as in 13 specimens more than two-thirds have this number. Doctor Wall records a specimen with 40 scale rows. Ventrals vary between 222 and 234, subcaudals between 75 and 90. Supralabials usually 8, but a specimen in the Hamburg Museum has 7 on one side, and other specimens are on record as having 9.

The size of the small scales on top of the head is not so variable as the figures given for the number of scales on a line between the supra-oculars, namely, from 7 to 13 would indicate, since the discrepancy depends chiefly upon the irregular size of these scales on the inter-ocular region.

The two specimens from Okinawa before me are smaller than the one described above and show a more definite color pattern. The lateral markings are so light as to be almost lost while the dorsal blotches are shorter, with a greater tendency to combine into median transverse marks across the middle line, thus forming angular cross-bars deeply notched in front and behind and with a large pale spot on each side of the median line. The pattern on the top of the head is also very sharply defined and formed as shown in Hilgendorf's figure of his type of T. riukiuanus (Plate XXVII, fig. 1 of this work).

Habitat.—This dangerous snake is confined to the islands of the Okinawa and Ō-shima subgroups of the Riu Kiu Archipelago, in some of which it appears to be rather common. Amani-o-shima, and—according to Doederlein, also Kome shima, are particularly notorious for the occurrence of the "habu," while both he and Fritze assert that it is much less common in Okinawa shima.

It is represented by closely allied species in the southern group and in Formosa.

List o	of a	оссинсия	of	Termeresurus	flavorreidis.

					•						
	1		-						i	uć.	-
Museiun	No	Sex and age.	Locality	When col- lected	By whom col- lected or from received	Scale rows.	Ventrale.	Attul	Subcaudala.	Interorbitals	Supralablata
			*	1855.				-		_	-
		44	"Amakariwa Is- land	April	Mr Macomb	ol			81		8
USNM	31915	Fettings 5	Amanii o-shina	1887	Dr H M Smath	<i>8</i> 5	22%	ι		13	N
sa toll fokyo	10	Younge	Oshiro mira Oki nawa shina	May 30	T 180 pro	6	222	1	87	9	ģ
Imp Mus fakyo	9	410	Okmawa shima			<u>\$1</u>	223	I	390	11	8
Hatolurg	240	do	de		Doctor War Jarg		227	1	MD	ā	7-8
Brit Mus	q	Lem ned	do		Dr 3 G Escher	υű	225	- 1	80		
196	b	[a #	do		lo	47	221	1	76		
Do.		Maled	do		Mr. Helst	4.)	231	- 1	90		
100		Nonnger	le .		de	33	PHI	- 1	79		
Do		Marcel	Lor Choo Is		H. Prver	1.1	223	- 1	8n		
Do	1	Youngs	do		li .	45		L	83		
Po	9	10	do		4b	51	.2.31	- 1	75	7.8	24
Berti	€"64 <u>"</u>	Adult	Nasc Armina		Ductor Big	Ľ	229	- 1	84		36
			e shiino		lerf						
Do	9,08	do f	go		der	7	7.17	1	Mi	• • •	8

clype has in high stell their unbird discale rows given is therefore and a lyind correct,

Speciments place

^{1 2 4 9}

Character Cat III post. To the service Tool Soc. 1887 p. 189.

Type of f(r,u) and Hillerhold p. 18. The scale formulas is heregiven for $\phi(t)$ in lividual may $\phi(t)$ covered is Hillerhold stratement is not quite expect. However, these correct for $\phi(t)$ is positions together.

TRIMERESURUS OKINAVENSIS a Boulenger.

KUFAH (native name in OKINAWA SHIMA according to TASHIRO).

1892. Trimeresurus okinavensis Boulenger, Ann. Mag. Nat. Hist. (6), X, Oct. 1892, p. 302 (type-locality, Okinawa shima; types in Brit. Mus.; Holst, collector).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 861; author's separate, p. 12 (Okinawa).—Lachesis okinavensis Boulenger, Cat. Sn. Brit. Mus., III, 1896, p. 549, pl. xxv, fig. 2 (Okinawa).—Wall, Proc. Zool. Soc. London, 1905, II, p. 516 (Okinawa; Amami; Yaku).

1894. ? Bothrops flavoviridis Fritze, Zool. Jahrb. Syst., VII, p. 860; author's separate, p. 11 (Tokuchimura, Okinawa) (not of Hallowell?).

Description.—Adult female; Science College Museum, Tokyo, No. 17; Okinawa shima; March, 1887; Tashiro, collector. Rostral nearly as high as broad, scarcely visible from above; behind the truncated upper edge three scales of the same size as the other upper head scales in a line between the anterior nasals and the first canthal scale; four canthal scales between anterior nasal and supraocular decreasing in size posteriorly; supraoculars wider than one-third the interocular space; 8 scales on a line between the supraoculars; head scales flat, smooth anteriorly, faintly tubercular or keeled on parietal and occipital regions; nostril large, rounded, in posterior margin of anterior nasal which is much larger than posterior, its upper anterior edge just visible from above, but not turned over the canthal edge; a small loreal, nearly twice as long as high below second and third canthal scales, in contact behind with the two preoculars, of which the upper is twice as wide as the lower; pit very large; subfoveal shield entering eye below preoculars; eye rather small; three small suboculars separated from supralabials by two scale rows; two postoculars; temporal scales numerous, the upper ones small, keeled, the lower series next to the supralabials larger, smooth; 8 supralabials, first small, triangular, separated from loreal by one scale, second broad, forming anterior border of pit, third largest; two lower labials in contact with anterior chin-shield; posterior chin-shield scarcely differentiated; 23 rows of rather obtuse scales with obscure apical pits, all keeled, except outer row, but keels not reaching the tip of the scales; 128 ventrals; anal entire; 51 pairs of subcaudals. Color (in alcohol) above brownish gray, with large transverse blotches of brown anteriorly and posteriorly narrowly edged with dusky; a series of lateral spots on the middle of the sides, each one below the corresponding dorsal blotch of which it is a detached portion and with which it is not alternating; below and alternating with these another row of dark brown spots situated on the two outer scale rows and the adjacent part of the ventrals; a broad dark brown, black-edged band three scales wide from eye over temporal region to posterior end of lower jaw, its anterior border crossing the last supralabial at the corner of the mouth; above this a narrower whitish band, and a similar one below it on the

last four supralabials, crossing to the lower jaw; sides of face anterior to this brown with two darker blotches across both lips at the level of second and fourth supralabial; on the lower lip a third similar dark brown blotch near the corner of the mouth; underside pale obscurely clouded with brownish.

		•
Ln	771	ensions.

\cdot	mm.
Total length	445
Snout to vent	
vent to tip of tail	74

Variation.—Supralabials vary between 8 and 7, ventrals between 127 and 134, subcaudals between 42 and 51 pairs in the three specimens which have thus far been recorded. Doctor Wall reports one specimen with 24 scale rows.

Habitat.—The few specimens known of this species have nearly all come from Okinawa shima. According to a recent paper by Doctor Wall the collector of Mr. Owston obtained not only four specimens in Okinawa shima, but also three in Amami-o-shima, and one in Yaku shima. The latter occurrence is so extraordinary, however, that it would be well to await corroborative evidence, as some mistake in the labeling may be possible.

As I have stated elsewhere, there is no near relative of this species known from Formosa, but as it is allied to the Himalayo-Chinese *Trimeresurus monticola*, the latter or a related form may be expected to occur in that island.

List of specimens of Trimeresurus okinavensis.

Museum.	No.	Sex.	Locality.	When collected.	By whom collected.	Scale rows.	Ventrals.	Anal.	Subcaudals.	Interorbitals.	Supralablala.
				1887.							i
Sci. Coll. Tokyo	. 17	Female a	Okinawa shima.	Mar.	Tashiro	23	128	1	51	8	8
Brit. Mus									43	9	8
Do	. b	do.b.	do		do	21	129	1	47	6	7
a)	— Descr	iption, p. 4	17 9.	b Types; F	Boulenger, Cat. 1	Π,	p. 54	9 			

TRIMERESURUS GRAMINEUS (Shaw).

1802. Coluber gramineus Shaw, Gen. Zool., III, Pt. 2, p. 420 (type-locality, Vizagapatam, India; based on Russell's Ind. Serp., I. pl. 1x).—Trimeresurus gramineus Guenther, Rept. Brit. India, 1864, p. 385. Boettger, Ber. Senckenberg. Naturf. Ges., 1888, Abh. p. 188 (South Formosa); 1894, p. 135 (Hainan).—Boulenger, Fauna Brit. India, Rept., 1890, p. 429 (southern China, India, Malay Peninsula and Archipelago, etc.).—Stejneger, Journ. Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 225 (Taipa, Formosa).—Lachesis gramineus Boulenger, Cat. Sn. Brit. Mus., III, 1896,

a Signifying of grass, grassy; referring to its green color.

p. 554 (southeastern Asia; Formosa).—Wall, Proc. Zool. Soc. London, 1903, p. 99 (Hongkong; Formosa).—Lachesis graminea Boettoer, Kat. Schl. Mus. Senckenberg., 1898, p. 139 (south Formosa, etc.)

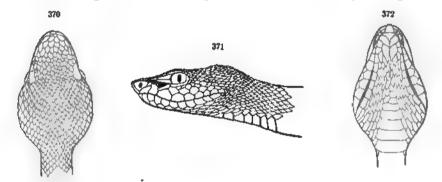
1802. Coluber viridis BECHSTEIN, Lacépède's Naturg Amph., IV, p. 252, pl. xxxix, fig. 1 (type-locality, Vizagapatam, India, based on Russell's Ind. Serp., I, pl. ix).—Trimeresurus viridis Lacépède, Ann. Mus. Paris IV. 1804, p. 209.

1839. Trigonocephalus erythrurus Canton, Proc. Zool. Soc. London, 1839, p. 31 (type-locality, Ganges Delta, India; type in Brit. Mus.; Cantor, collector — Trimeresurus.erythrurus Guenther, Rept. Brit. India, 1864, p. 386.— Swinhoe, Proc. Zool. Soc. London, 1870, p. 412 (Takow, Formosa).

1842. Trimesurus albolabris Gray, Zool. Miscell., (p. 48) (type-locality, China; types in Brit. Mus.; Reeves, collector).

1853. Trimesurus elegans Gray, Ann. Mag. Nat. Hist. (2), XII, p. 391 (type-locality, Sikkim; type in Brit. Mus.; Hooker, collector) (not Craspedocephalus elegans Gray, 1849).

Description (figs. 370-372).—Adult male; U.S.N.M. No. 36516; Taihoku (Taipa), Formosa; September, 1897; T. Tada, collector. Rostral as high as broad, very narrow above, nearly triangular



Figs. 370-372. -Trimeresurus gramineus. 1 $\frac{1}{2}$ × nat. size = 370, for of head; 371, side of head; 372, underside of head. No. 2º Sci. Coll. Tokyo.

bordered behind by a single scale between the upturned anterior corners of the nasal, just visible from above; canthus rostralis sharp, formed anteriorly by the upturned edge of the nasal, the upturned edge of an elongated shield corresponding to the loreal in the other species here described and the upturned portion of the upper preceular; head shields small, smooth anteriorly, keeled on parietal and occipital regions; supraoculars very narrow, occupying only the outer edge of the supraocular region, their width being scarcely more than one-fifth the distance between them; about 12 scales on a line between the supraoculars; nasal large, smooth, undivided, with a round nostril pierced near the lower edge; behind it above, on the canthal ridge an elongated shield, being the loreal of the other species; below it, separating it from the first supralabial, and between nasal and the upper portion of second supralabial which

enters the pit, two small scales, one above the other, two elongate anterior preoculars, the upper, which is somewhat wider anteriorly turned up over the canthal ridge, the lower forming the upper border of the large pit; the subfoveal as large as the lower preocular, pos teriorly entering eye between the latter and the subocular; a long narrow, crescentic subocular anteriorly in contact with subfoveal separated from fourth and subsequent supralabials by one and pos teriorly two rows of scales; three small postoculars on left side, two on right; temporals numerous, lower ones largest, upper ones smaller keeled; 10 supralabials, first small, triangular, second very high forming anterior border of pit, third largest, fourth slightly largest than fifth to tenth, which are subequal; 3 lower labials in contact with anterior chin-shields, posterior chin-shields scarcely differentiated 21 rows of narrow, pointed, keeled scales without apical pits; 16: ventrals; anal entire; 69 pairs of subcaudals; tip of tail rather blunt. Color (in alcohol) above saturated uniform "parrot-green;" from the subocular, under the center of the eye, a narrow, strongly defined, pale-yellowish line, the lower row of temporals and acros the last supralabial to the side of neck and from there to near the tip of the tail on the middle line of the outer scale row, the lower edge o which is somewhat darker than the rest of the body; underside paler green, washed with blue so as to be almost "beryl-green' toward the sides; tips of tail colored like the rest of the body.

Dimensions.

	mm.
Total length	618
Snout to vent	
Vent to tip of tail	_
The control carries and carrie	1.00

The female appears to have a relatively much shorter tail. No. 2a Science College Museum, measuring 525 mm. in total length, has a tail only 92 mm. long.

Variation.—The Formosan specimens examined by me are very uniform, both in scutellation and coloration, as will be seen from the table at the end, but in individuals from all over the wide range of the species there is displayed a corresponding range of variation. Thus, 19 and 23 scale rows are occasionally, though rarely, recorded; supralabials vary between 8 and 12, ventrals between 145 and 175, subcaudals between 53 and 75 pairs. The color variations consist in more or less distinct blackish dorsal cross bands and the absence of the lateral yellow line. The terminal portion of the tail is frequently yellow or reddish, a color phase which until recently was regarded as a distinct species under the name of Trincresurus crythrurus.

Habitat. This species is widely distributed from the Himalayas in the north and west, through India, Indo-China, southern China, to the Malayan peninsula, Sumatra, Java, and Timor in the south, and Formosa in the east.

In Formosa it was first collected by Swinhoe, who found it at Takow, no less than seven specimens from him being in British Museum. Both the Hamburg and the Senckenbergian Museum, in Frankfort on the Main, have specimens from south Formosa, the former (No. 1541) through Doctor Warburg, the latter through Schmacker. Mr. Tada, who collected in Formosa for the Japanese Government in 1896 and 1897, brought four specimens from Taihoku (Taipa), and stated that it is common, especially in northern Formosa.

List of specimens of	ſ	Trimeresurus	gramineus.
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Museum.	No.	Вех.	Locality.	When collected	By whom collected	Scale rows	Ventrals	Anal	Subcaudals	Interorlital	Supralahlata.
		!		1897.							
U S.N M	36516	Malea	Taips, Formosa		T Tuela	21	164	1	C9	12	10
Sci. Coll.,	2a	Female t	do	do	do	21	158	1	68	12	9-10
Tokyo.											
Do	25	Male	do	do .	, do	21	138	1	69	11	10
Do'	2c	do	do	do	do	21	159	1	73	11	9-10
Brit Mus	2		Fотпоза		R Switches	21	163	1	67		
Do	4	1	do		, do	21	159	1	71		
Do .	ß	do.c .	do		, do	21	156	1	1383		
Do .	γ	do.c.	do		do ,	21	163	1	-88		
Do	å	do.c	do		do	21	155	1	455		
Do	e	do, c	do .		. do	21	182		66	1	
Do .	5	do.c	do		do .	21	151		60		
				.'				_			
a J:	escript	ion, p. 481	» Fige 37	0-372.	c Boulenge	βΓ, Ca	at. 111	ι, p.	556.		

Subclass SYNAPSIDA.

1903. Synapsida H. F. Osborn, Science (n. s.) XVII, Feb. 13, 1903, p. 276.

Order TESTUDINATA.

- 1788. Testudines Barsch, Anleit. Kenntn. Thiere, Mineral., 1 (p. 437).
- 1802 Chelonia Macartney in Ross' Transl Cuvier's Lect. Comp. Anat., I, tab. in.
- 1804. Chelond LATREILLE Nonv. Diet d' Hist. Nat., XXIV, tabl. méth. p. 61.
- 1807. Cataphracta Link, Beschr Nat. Samml, Rostock, H. p. 51.
- 1811. Testudinata Oppel, Ordn. Rept., p. 3.
- 1814. Perostia Rafinesque, Succelho Sci. (Palermo) II, no. 9, 1 Sett., 1814, p. 66
- 1822. Chelonea Freming, Philos. Zool., 11, p. 268
- 1825. Fornicata Hawouth, Philos. Mag., 1825. (p. 372).
- 1828 Sterrichrotes Ritgen, Nova Acta Acad (Leop Carol), XIV, p. 269
- 1828 Chelynic Wygler, Isis, 1828, p. 861
- 1837 Chelonites BURMEISTER, Handb Naturg , p. 730
- 1839 Chelonider Swainson, Nat. Hist, Classif, Fish. Amph. Rept., II (Lardner's Cab. Encycl.), p. 112
- 1845. Testudinea Graveshorst, Thierwell, p. 45.
- 1849. Tylopoda MAYER, Rheinland und Westphal Verhandl., VI (p. 177).

cumstances it does not seem necessary to submit any general description of this easily identified, gigantic animal. The young may be found some day in the southern waters adjacent to our territory and may then be referred to their proper place in the system by a comparison with the appended text figures, which are taken from an Atlantic specimen (figs. 373-376).

A specimen was recently captured in Japan and acquired for the Royal College of Surgeons in London, where the skeleton is now

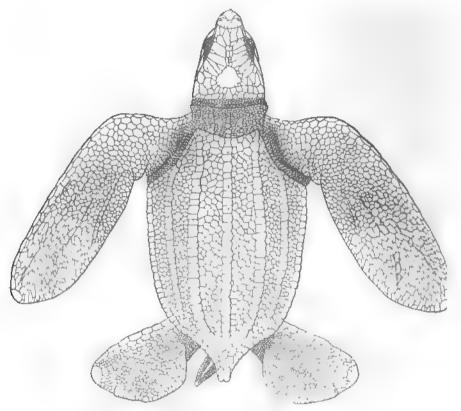


Fig. 373. Dermochtens corta ex, voend - Nat Size - entire animal from above. No. 19796, U.S.N.M.

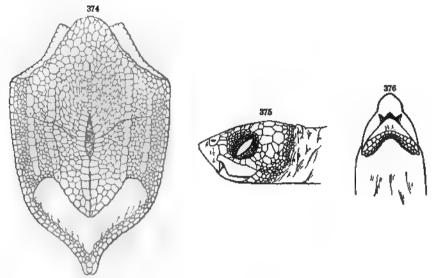
preserved. A detailed account of the muscular and visceral anatomy of this specimen has been published recently by Mr. R. H. Burne.

Mr. Bur is gives the following description of some of the external parts of this a final.

Description. Young tenale; Museum Roy College Surgeons, London; Japan.

In color the animal was black above, blotched with irregular white spots, each of which measured on an average 1.2 cm, in diameter. The ventral surface of the body, limbs, and tail was dirty white, marked with irregular longitudinal bands and blotches of black.

The six longitudinal areas into which the carapace is divided by seven bony ridges are apparently of equal breadth - 11 cm. in the middle of the trunk—gradually narrowing toward the tail.



Figs. 374-376. Dermochelys comiacea, young. Nat size. 374, underside of shell; 375, side of head, 376, underside of head. No. 19796, U.S.N.M.

There are six rows of scutes half embedded in the thick plastral integument, a double row along the mid-line, with two single rows about 11 cm, apart on either side.

Dimensions.

	mm.
Total length (following the curve of the carapace)	1,350
Length between the bases of the flippers	680
Girth (under fore limb)	1,350
Girth (midway between the limbs)	1,400
Girth (at base of hind limb)	910
Length of fore limb from its point of emergence from the body (fol-	
lowing the outer curve)	820
Greatest breadth of hand	200
Length of hind limb (tibial border)	330
Girth of head at hinder extremity of the gape	530
From point of snout to inner canthus of eye	85
From point of snout to nostril	25

Habitat. Tropical seas between the east coast of Africa and the west coast of South America, occasionally straggling farther north. Thus von Siebold obtained the specimen, from which the figure in Fauna Japonica is taken, in Japan. In the Imperial Museum, Ueno Park, Tokyo, there is one from the coast of the province of Tango, on the Sea of Japan. A young female was recently acquired by the Royal College of Surgeons, in London, from A. Owston.

Suborder LAMINIFERA. a

1820. Laminifera Hemprich, Grundr. Naturg., p. 102.

1880. Aspidochelyida Seeley, Quart. Journ. Geol. Soc., XXXVI, p. 412.

1895. Ccrachelya H.Eckell, Syst. Phylog. Wirbelth., p. 🦠

This suborder, which comprises the Cryptodira and Pleurodira of Cope and many later authors and which equals Dollo's Thecophora minus the soft-shelled turtles, as well as Baur's Paradiacostoided minus the leather-back turtle, is trenchantly characterized by the horny plates which externally cover the shell.

Hemprich, as early as 1820, established the present division as opposed to that of the Athecæ plus Chilotæ, which he designated collectively as Coriacea.^b

The horny-shelled turtles belong to two different superfamilies, the Testudinoidew, corresponding to the group Cryptodira, and the Chelydoidew, equaling the Pleurodira, but only members of the former enter our limits, as at the present day the latter are confined to the southern hemisphere. Of the numerous families composing the Testudinoidew only two are intralimital, viz, the marine turtles, with paddle-shaped limbs having less than three claws, and the subfamily Emydinar of the family Testudinidar, having normal limbs with more than two claws.

Family TESTUDINIDÆ.

Subfamily EMYDINÆ.

Web-footed turtles having the nuchal plate without costiform lateral processes.

The terrapins constitute the bulk of the species and genera of turtles, widely distributed in the temperate and tropical countries. They live in streams, lagoons, or on land, and are both vegetable and animal feeders. Some species are highly esteemed as delicacies.

SYNOPSIS OF THE EMYDINE GENERA OCCURRING IN JAPAN, FORMOSA, AND KOREA.

 a^1 Plastron not hinged; plastron and carapace joined by suture.

 b^1 Triturating surface of upper jaw with a longitudinal median ridge. Ocadia, p. 489,

 b^2 Triturating surface of upper jaw without a median ridge.

c Choana between the eyes; upper surface of head with undivided skin.

g From lamina, a thin plate [of horn, in this case], and fero, I bear, b Grundr. Naturg., 1820, p. 401.

Each of these genera is represented in the territory here included by a single species only, which may be more conveniently identified by the following:

ARTIFICIAL KEY.

- a¹ Plastron emarginate behind.
 - b^1 Axillary and inguinal shields present; upper jaw not hooked.
 - c^1 Whole top of head smooth.
 - d¹ Sides of head with numerous narrow longitudinal yellowish stripes; plastron yellow, each shield with a large brown blotch......Ocadia sinensis, p. 489.
 - d^2 Head nearly uniformly colored; plastron mainly black.

Clemmys japonica, p. 492.

c² Posterior half of top of head with skin divided into small shields.

Geoclemys reevesii, p. 497.

Genus OCADIA a Gray.

1870. Ocadia Gray, Suppl. Cat. Shield Rept. Brit. Mus., I, p. 35 (type, Emys sinensis).

Only a single species of this genus is known.

OCADIA SINENSIS Gray.

Plate XXVIII.

1834. Emys sinensis Gray, Proc. Zool. Soc. London, 1834, p. 53 (type-locality, southern China; type in Brit. Mus.; J. Reeves, collector); Cat. Shield Rept. Brit. Mus., I, 1855, p. 21, pl. vii (Canton, China).—Swinhoe, Ann. Mag. Nat. Hist. (3), XII, 1863, p. 219 (Taiwan fu, Formosa).—Guenther, Rept. Brit. India, 1864, p. 27 (south Formosa).—Ocadia sinensis Gray, Suppl. Cat. Shield Rept. Brit. Mus., I, 1870, p. 35; Proc. Zool. Soc. London, 1873, p. 192 (skull, figure).—Boulenger, Cat. Chel. Brit. Mus., 1889, p. 85 (Canton; Formosa).—Boettger, Kat. Rept. Mus. Senckenberg., I, 1893, p. 4 (Takao, Formosa).—Stejneger, Journ. Sci. Coll. Tokyo, XII, Pt. 3, 1898, p. 225 (Taipa, Formosa).

1844. Emys bennettii Gray, Cat. Tortois. Brit. Mus., p. 21 (type-locality "North America?"; type in Brit. Mus.); Cat. Shield Rept. Brit. Mus., I, 1855, p. 22, pl. x b (China?); Proc. Zool. Soc. London, 1863, p. 176 (identity with E. sinensis).—Sclater, Proc. Zool. Soc. London, 1862, p. 151

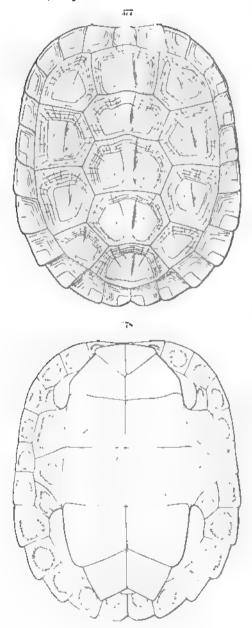
1870. Emys chinensis Gray, Suppl. Cat. Shield Rept. Brit. Mus., I, p. 28 (emended name).

Description.—Young, probably second year; Science College Museum, Tokyo, No. 29; Taipa, Formosa; September, 1896; T. Tada, collector (figs. 377-381). Snout conical, projecting, vertical profile oblique, straight; edges of jaws not denticulated, upper jaw without median or lateral hooks, distinctly notched mesially; triturating surface of upper jaw with a longitudinal ridge near the inner edge; mandibular symphysis less than length of eye slit; skin on

a A coined word without meaning.

b Lower figure reproduced in this work on Plate XXVIII.

entire top of head smooth; body rather depressed, the depth being but slightly more than half the width of the carapace; carapace with



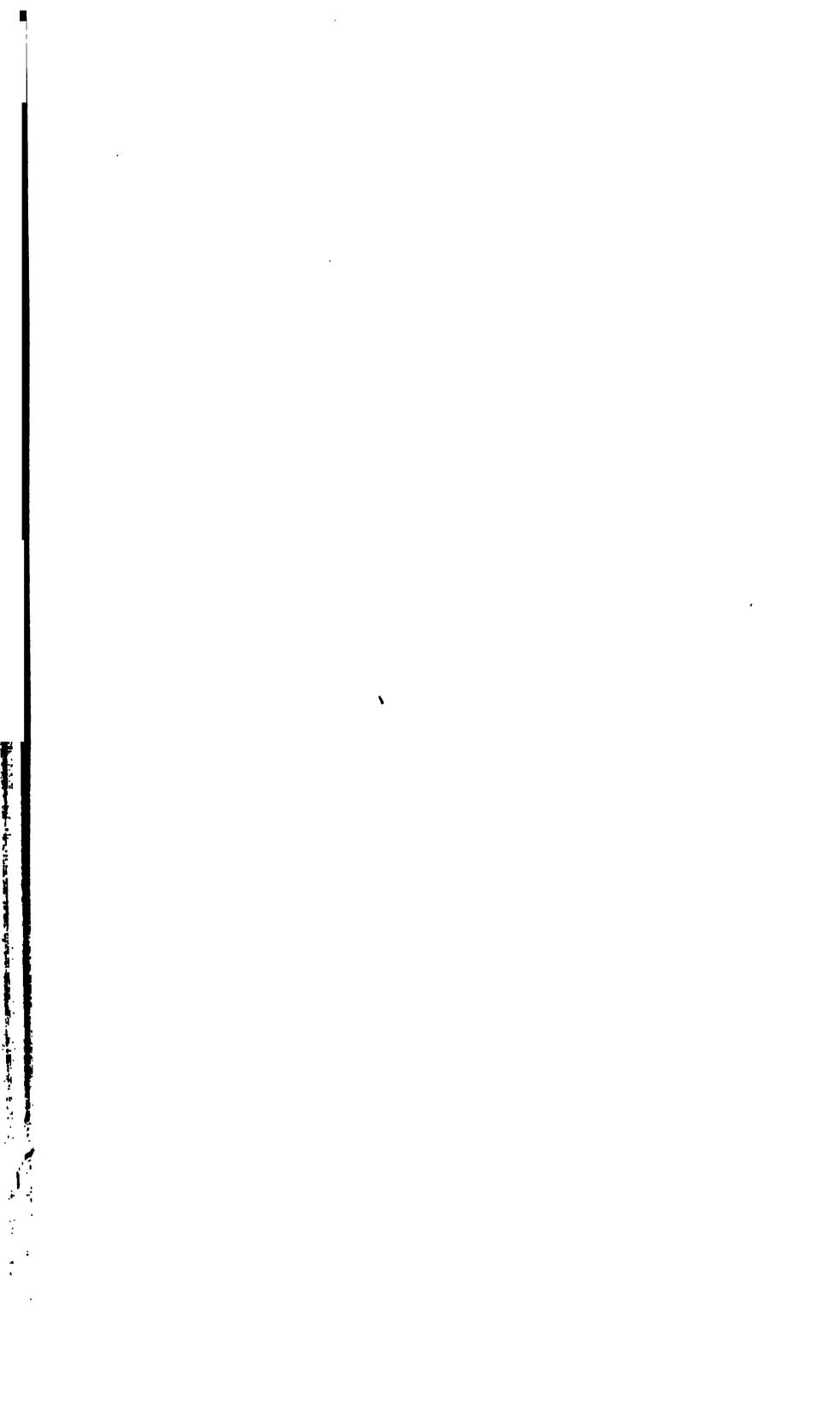
EDGS AT AS TRAILESPANS SONE SIZE OF CARA-FALL US LEASTEDN NO 29 SOLEOUS TORYO

three keels, a median, continuous, broad, prominent, and one on each side consisting of four narrow, low keels, one on each costal, in a discontinuous series inasmuch as being placed obliquely across the costal shields the posterior end of each keel extends externally beyond the anterior end of the one following; nuchal broader than long; first vertebral squarish. somewhat broader in front than behind; all vertebrals broader than long, about as broad as the adjacent costals; margin slightly turned up, not serrated behind, though the posterior corner of each marginal extends slightly beyond the one following: eighth and ninth marginals broadest; plastron flat, emarginate behind sharply bent at the bridge, truncate anteriorly; posterior lobe as long as the width of the bridge. narrower than the shell: abdominal seam longest, equaling gular and humeral seams together, the latter being the shortest; pectoral seam as much longer than the femoral seam as the latter is longer than the anal seam; inguinal shield twice as large as axillary, toes webbed to the tips: tail long, a little more than one-half the length of the carapace, tapering to a point.

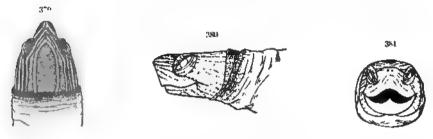
Color (in alcohol): Carapace raw umber, each shield with a large, polygonal, excentric, well-defined reddish brown spot, each marginal



OCADIA SINENSIS FROM GRAY!



anteriorly narrowly edged with bright yellow; underside of shell ocher yellow, each shield with a large reddish brown blotch at the outer posterior corner, each marginal and each shield on bridge with a narrow circle of dark brown, the reddish brown blotches being placed



Figs. 379-381.—Ocadia sinensis. 1½ x nat. size. 379, top of head, 380, side of head; 381, head from front. No. 29, Sci. Coll. Tokyo.

excentrically to this ring; crown uniform olive-brown, the rest of head and neck olive, with narrow longitudinal black-edged, pale yellow stripes between pale olive stripes of nearly the same width; legs, feet, and tail similarly striped.

Dimensions. Greatest length of carapace 73 Greatest width of carapace 58 Greatest length of plastron 66 Length of hind lobe of plastron 24 Width of hind lobe of plastron 32 Width of opening of shell posteriorly 38 Width of bridge 24 Depth of shell 31 Width of head 12 Length of tail from vent 38

The adults are said to have shorter tails, the females shorter than the males. In very young specimens the tail is said to be about two-thirds the length of the shell. The lateral keels usually disappear in the adults, according to Boulenger, who records an adult specimen with a length of shell of 230 mm.

Variation.—The edges of both jaws are described by Boulenger as finely denticulated, and the pectoral seam as equaling or exceeding the gular and humeral seams together; nuchal may be longer than broad, and second and third vertebrals may be as long as broad.

Habitat.—The present species seems to be restricted to southern China and the island of Formosa. On the latter it has been recorded both from the northern and from the southern part. Swinhoe had it from Taiwan fu and the Senckenberg Museum has it from Takao, while I have examined a specimen from Taipa, and Mr. Tada notes it as common in the Tamsui River, though he may possibly have confounded it with Cyclemys flavomarginata.

List of specimens of Ocadia sinensis.

<u>M</u>	luseum.	No.	Age.	Locality.	W h	en col- led.	By whom collected.
Sci. Coll. T	okyo	29	Young 4	Taipa, Formosa	Sept.	, 1896	T. Tada.

a Description, p. 489; figs. 377-381.

Genus CLEMMYSª Ritgen.

- 1828. Clemmys RITGEN, Nova Acta Acad. Leop. Carol., XIV, Pt. 1, p. 272 (type, Emys punctata).
- 1832. Chelopus Rafinesque, Atlantic Journ., I, no. 2, p. 64 (same type).
- 1857. Nanemys Agassiz, Contr. Nat. Hist. U. S., I, p. 442 (same type).
- 1857. Calemys Agassiz, Contr. Nat. Hist. U. S., I, p. 443 (type, C. muhlenbergii).
- 1857. Glyptemys Agassiz, Contr. Nat. Hist. U. S., I, p. 443 (type, G. insculpta).
- 1857. Actinemys Agassiz, Contr. Nat. Hist. U. S., I, p. 444 (type, A. marmorata).
- 1869. Mauremys Gray, Proc. Zool. Soc. London, 1869 (p. 499) (type, M. lanaria).
- 1870. Geoclemmys Gray, Suppl. Cat. Shield Rept. Brit. Mus., p. 26 (type, G. guttata; not of 1855).
- 1870. Socalia Gray, Suppl. Cat. Shield Rept. Brit. Mus., p. 35 (type, S. bealii).
- 1870. Emmenia Gray, Suppl. Cat. Shield Rept. Brit. Mus., p. 38 (type, E. grayi).
- 1870. Eryma Gray, Suppl. Cat. Shield Rept. Brit. Mus., p. 44 (type, E. laticeps).

CLEMMYS JAPONICA (Temminck and Schlegel).

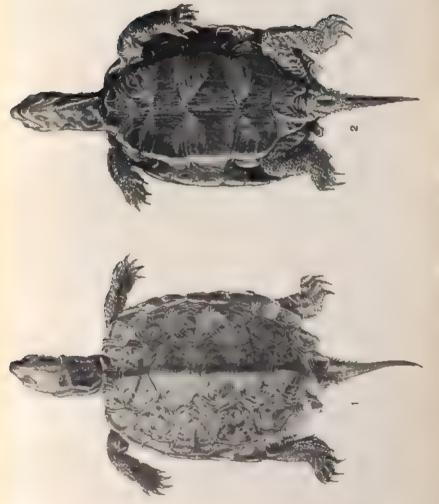
ISHIGAME.

Plate XXIX.

- 1835. Emys vulgaris Temminck and Schlegel, Fauna Japon., Rept., p. 53 (Japan) (not of Gray 1831).
- 1835. Emys vulgaris japonica Temminck and Schlegel. Fauna Japon., Rept., p. 139 (Japan). Schlegel. Abbild. Amph., 1840, p. 126, pl. xii.
- 1835. Emys palustris var. japon[ica] Temminck and Schlegel, Fauna Japon., Rept., pl. viii, figs. 1-4;b pl. 1x.
- 1844. Emys japonica Gray, Cat. Tortois. Brit. Mus., p. 19 (Japan); Proc. Zool. Soc. London, 1869, p. 190 (Japan).— Окара, Cat. Vert. Japan, 1891, p. 71 (Awaji: Bingo; Suwa; Chikuzen).—Ctemmys japonica Strauch, Chelon. Studien, 1862 (p. 32); Mém. Acad. Sci. St. Pétersb. (7), XXXVIII, no. 2, 1890, p. 70 (Tsu-shima; Hondo).— Ниденновъ, Sitz. Ber. Ges. Naturf. Fr. Berlin, 1880, p. 111 (Tokyo).— Воилендев, Cat. Chel. Brit. Mus., 1889, p. 106 (Kobe; Yokohama).—Воеттаев, Каt. Rept. Mus. Senckenberg., I, 1893, p. 5 (Tokyo).
- 1851. Emys caspica var. Duméril, Cat. Méth. Rept. Mus. Paris, p. 8 (Japan).
- 1852. Emys caspica var. japonica Dumériu, Arch. Mus. Paris, VI, p. 219.
- 1878. Cistudo lutaria Boettger, Offenbach, Ver. Naturk. 17 and 18 Ber., p. 8 (Japan) (not of Linnaus, Bell, nor Schneider).

Judging from the above synonymy one might suppose that the Japanese Clemmys is a particularly close ally to one or both of the west-palearctic species, since it has been described as a variety of Emys vulgaris by Temminck and Schlegel, and as a variety of Ecaspica by Duméril. This is not so, however, and the only character which points in that direction is the short anal seam, a character

From $\kappa\lambda\ell\mu\nu\nu\xi$, turtle. b Figs. 2-3 reproduced in this work on Plate XXIX.



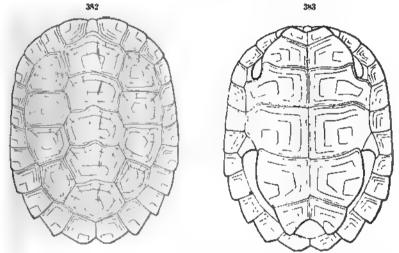
CLEMMYS JAPONICA FROM SCHLEGEL |
FOR EXPLANATION OF PLATE SEE PAGE 556.





which is not constant, as shown later on. Nor does it appear to be very closely allied to any of the other species of Clemmys known with certainty to occur on the Chinese mainland, viz, C. bealii and C. nigricans. Its nearest relative seems to be C. schmackeri, described not long ago by Doctor Boettger from a young specimen, the locality of which is given as "China, probably Hainan." It is permissible to suggest that this species may occur in various parts of southern China, and that the unconnected position of C. japonica, so curious in view of the close relationship of the other two Japanese turtles, Amyda japonica and Geoclemys reevesii, may be more apparent than real.

Clemmys japonica and Ocadia sinensis are very easily told apart by color alone as indicated in the "key" above (p. 489), but in general proportions, relations of shields, etc., they show many similarities,



FIGS. 382-383.—CLEMMYS JAPONICA. § NAT. 812E. 382, CARAPACE: 383, PLASTRON. No. 23522, U.S.N.M.

although a more close examination of details will reveal a great number of important differences. Apart from the difference in the triturating surface of the upper jaw, with a longitudinal ridge in the latter and without one in the former, C. japonica has no median notch to the edge of the upper jaw; its shell is more depressed and the hind lobe of the plastron relatively broader; the posterior outline of the carapace is also strongly segrated.

Description (figs. 382-383). Female, third year: U.S.N.M., No. 34066; Tokyo; February 23, 1904; A. Owston collection. Snout but slightly projecting, vertical profile slightly oblique, straight; edges of jaws not denticulated, upper jaw without hooks or median notch; triturating surface of upper jaw narrow without any longitudinal ridge; mandibular symphysis nearly equaling length of eye slit; skin on entire top of head smooth; body rather depressed, the

depth being considerably less than half the length of carapace and but slightly more than half its width; carapace with a single, median, undulating keel; shields with deeply cut concentric lines toward the border, the vertebrals and costals with well-marked bosses from which issue radiating lines; nuchal rather large, almost as broad as long; first vertebral slightly wider than the others, which are as broad as or broader than the adjacent costals, and all much broader than long; edge of marginals from third to eighth turned up, behind the latter each marginal extending considerably beyond the next with its posterior corner, so that the outline is strongly serrate; eighth and ninth marginals broadest; plastron flat, angularly notched behind, obtusely emarginate in front, bridge angle gently rounded, each shield with deeply cut parallel lines mostly along the anterior and interior margins; posterior lobe fully as long as the bridge, as wide as the opening of the shell; abdominal seam much the longest, longer than that of humerals and gulars together, femoral seam longer than anal; inguinal shield somewhat larger than axillary; toes webbed to the tips; tail rather long, more than one-third the length of the carapace, tip rather blunt, base studded with numerous high conical tubercles or blunt spines. Color (in alcohol): Carapace tawny-olive, obscurely spotted with dusky; dorsal keel burnt umber, this color spreading sidewise on the transverse seams of the vertebrals; costals paler buff toward the outer margin, the dusky or blackish maculations being more distinct on this pale belt; underside uniformly black; head above uniform olive; a narrow black line from nostril to eye, and a narrow, pale, black-edged supratemporal band from the posterior corner of eye; neck olive gray with numerous raised, slightly tuberculated longitudinal ridges which appear to be paler; legs and feet blackish, with a pale band along the inner edge of forearm and tibia; tail with obscure, pale, longitudinal bands, one on each side of the median line.

Dimensions.

	mm.
Greatest length of carapace	124
Greatest width of carapace	
Greatest length of plastron	
Length of hind lobe of plastron	
Width of hind lobe of plastro 1	
Width of bridge	
Depth of shell	47
Width of head	
Length of tail from ye. t	

The adult is more elongate in proportion to width and depth than the one described above. The male differs but slightly from the female, the plastron being scarcely concave, but the hind lobe of the plastron is slightly narrower and the depth of the shell somewhat

less. The recently hatched young (No. 23526, fig. 384) is nearly circular, with relatively much longer tail than the older ones, and the posterior marginals are notched externally so as to make the outline exceedingly serrate; the nuchal is usually notched; and the gulars are truncate anteriorly, each with a lateral notch. The proportions at various ages can be seen from the measurements in the table of specimens at the end of this article. The young of the first year differ also in color, being isabella-colored above with

very faint dusky maculations and reticulations and pale outer edges to the marginals; the plastron is more or less uniform blackish brown with pale edges and the marginals are pale with dusky markings on the seams; the pale longitudinal stripes on neck and legs are more distinct than later.

Variation.—The relative proportions of the various shields and their seams are subject to some variation. The most important, perhaps, is that of the femoral and anal seams, as the proportion of these has been used as an important character in distinguishing the various species of this genus. In most specimens of C. japonica the femoral seam is longer, often much longer than the anal, but in our only very large specimen (U.S.N.M. No. 9551) the anal seam is 27 mm. and the femoral only 23 mm., consequently not less than 4 mm. shorter than the former. variations in color are neither con-

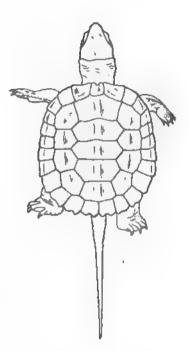


FIG. 384. CLEMMYS DAPONICA, YOUNG NAT. SIZE. No. 235% U.S.N.M.

siderable nor important. Often the posterior corner of the anal shields is pale or whitish, the pattern on the carapace more or less distinct, the stripes on side of head more or less obliterated or in some specimens more emphasized than described above. One of our specimens (No. 34067) has a pale black-edged stripe on the upper lip at the angle of the mouth and a similar parallel stripe on the lower jaw.

Habitat.—Confined to Japan, so far as known.

Published records show that it occurs as far north at least as Tokyo. Specimens from the neighborhood of this city and Yokohama are in various museums. British Museum has a specimen from Kobe and I have seen one from Kagoshima, Satsuma, in Kiusiu. Doctor Lenz, in 1896, collected it in the provinces of Setsu, Kii, and Bizen (Hamburg Mus. Nos. 184, 186, 187), and Okada records it from the

provinces of Awaji, Bingo, Suwa, and Chikusen. The Academy of Sciences in St. Petersburg has it from Tsushima.

No.	Sex and age.	Locality.	When to diseased.	By whom collected or from whose francistry).	Longth of cattle-	Width of cars-	Length of plat-	Whath of blud foto.	Width of bridge.	Depth of shell.	Tall, from weat,
1684	Tēmaja e	Japan	1896.	E. S. Mores	102	120	imar 871	mor 108	19 III.	72	70 ·
1522	Young	Yokohama	Oct	L. Steineger			1				****
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1524	do, c	40	do	do		10100	41777	10000		190	
3525		фо		do				40			
1828	,.do, ∉	do	do	do	-36	21	20	16	8	ы	32
1007	do e	do	do	do		1000			1.75	1010	P. A. B. A.
100s	Female 4	Tokyo	Feb. 20	A. Owston	,194	-86	117	60	42	47	46
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lode:				do.,		BL	100	23	35	40	31
KHO				do		10111		11444			1944
1070				40	P-1 0 4 4	*****	4 - 4				
1071 .			1	do.,		-56	80	41	20	39.	84;
1072	and the first factor of the contract of the co					4 4 5 5 5	11.				awake.
1073		40		do,	* * * * * *						
1074	do.e.	do		do .		1 .					4
1075	do. #.	do	de	do						1	**

P. 495.Second year, figs. 382–383.

Genus GEOCLEMYS Gray.

1855. Geoclemys Gray, Cat. Shield Rept. Brit. Mus., 1855, p. 17 (type, G. hamiltoni).

1869. Damonia Gray, Proc. Zool. Soc. London, 1869, p. 193 (type, D. macro-cephala G. subtrijuga)

In his Catalogue of Shielded Reptiles (1855) Gray first established the genus *Geoclemys* for the following species, without indicating a type:

G. hamiltonii. G. seba. G. muhlenbergii.

G. reevesii. G. pulchella. G. guttata.

Two years later Agassiz * made each of the last three species a type of separate genera, respectively Glyptemys, Calemys, and Nanemys.

G, seba is a synonym of Emys trijuga Gray (1855) which he himself in 1869 made the type of his new genus Melanochelys.

^{*}Recently hatched, fig. 284. *Third year: description, p. 493.

[/]Third year.
#Second year.

Recently hatched

a From γη, earth, land; and clemys, erroneous for κλεμμυς, a turtle.

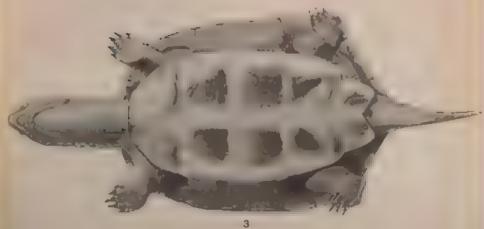
b Contr. Nat. Hist. U. S., I, 1857.

c Proc. Zool. Soc. London, 1869, p. 187.





2



GEOCLEMYS REEVES FROM GRAY

FINERP ALATE FLA SEE FAG 556

provinces of Awaji, Bingo, Suwa, and Chikuzen. The Academy of Sciences in St. Petersburg has it from Tsushims.

1 .8. N M. No.	Sex and age.	Locality	When collected	By whom collected or from whom received.	Longth of cara-	Width of cars-	Langth of plac-	Width of hind	Width of hridge.	Depth of shell.	Tall, from yend.
9551	Fémals 4	Jupan	1806.	E. S. Morse.	182	128	175	74 78 108	194 min. 68	## en. 78	90 74 66
23522	Young 5	Yokohema	, Uct	L Steineger							
23523	Location Co.	40	. oh.	40				٠		ļ,!	Ļ
23524	do.c	, do.	i, do.,	do		į	i			ļ.,,,	
23525	do.e	do	da	dn		١,					
23526	do.¢	do	do,	40,	35	31	29	16	9	14 ;	33
23527	do	do	do 1904.	do		*****				••••	
340%	Female .	Tokyo	, Feb. 23	A Owston	124	85	117	άQ	42	47	42
34067	Male /	-								***	
	do. /		do.		112	81	100	63	35	40	31
34068											
34068 34069	Young a .	, do ,	.,do	.do	'	*****					
34058 34019 34079	Young g do. g.	do 🕠	dn	do	'					!	
34068 34009 34070 34071	Young # do. #	do	do . do.	ob	. 87	66	80	41	20	33	34
34058 34059 34059 34071 34072	Young \$\sigma\$. do, \$\sigma\$ do, \$\sigma\$	da . . da . do	do . do. do.	do do	. 87	66	80	41	20	33	34
34058 34059 34079 34071 34072 34073	Young \$\sigma\$, do,\$\sigma\$,do,\$\sigma\$,do,\$\sigma\$.	र्वत , , व्यः, , , वेच, , , वेच	do do . do . do	do	. 87	66	80	41	29	33	34
34058 34059 34070 34071 34072 34073 34074	Young # . do.#do.#do.# do.# do.# do.#	do	do do . do . do . lo	do .do .do .do	. 87	66	80	41	29	33	34
34058 34079 34079 34071 34072 34073	Young \$\sigma\$, do,\$\sigma\$,do,\$\sigma\$,do,\$\sigma\$.	र्वत , , व्यः, , , वेच, , , वेच	do do . do . do	do	. 87	66	80	41	29	33	34

Genus GEOCLEMYS Gray.

1855 Gradenoys Guvy Gat, Shield Rept. Brit, Mus., 1855, p. 17 (type, G. hamilton)

1889 Damonia Gray Proc Zool Soc London, 1869, p. 193 (type, D. macro-cephala G subtringa

In his Catalogue of Shielded Reptiles (1855) Gray first established the genus Geochemys for the following species, without indicating a type:

G. handtonii, G. seba, G. muhlenbergii. G. recresii, G. pulchella, G. guttata,

Two years later Agassiz* made each of the last three species a type of separate genera, respectively Glyptings, Calemys, and Nanemys.

G seba is a synonym of Encys trijuga Gray (1855) which he himself in 1869° made the type of his new genus. Melanochelys.

From j n̂, earth land, and clemps erroneous for κλυμίος, a turtle.

⁶ Contr. Nat. Hist. U. S., L. 1857.

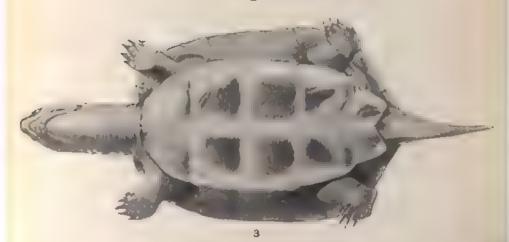
^{*} Proc. Zool. Soc. London, 1869, p. 487.



1



2



GEOCLEMYS REEVESH FROM GRAY

PUR EXPLANATION OF PLAT SEE FAG. 556



This leaves only the species G. hamiltonii and G. reevesii in the genus Geoclemys, and both being strictly congeneric it matters not which one we select as the type. It is, consequently, quite irrelevant that Gray himself in 1869 a included these in his new genus Damonia. As the latter only includes species congeneric with G. hamiltonii and reevesii, it becomes a synonym of Gray's Geoclemys of 1855. His Geoclemys of 1869, as he then spelt it, on the other hand becomes a synonym of Clemmys.

GEOCLEMYS REEVESII b-(Gray).

Plate XXX.

- 1831. Emys recresii Gray, Synops. Rept., p. 73 (type-locality China; types in Brit. Mus.; J. Reeves, jr., collector).—Ruetimeyer, Verh. Naturf. Ges. Basel, VI, Pt. 1, 1873, p. 48 (Japan).—Geoclemys recresii Gray, Cat. Shield Rept. Brit. Mus., I, 1855, p. 18, pl. vc (China).—Damonia recresii Gray, Proc. Zool. Soc. London, 1869, p. 194.—Boulenger, Cat. Chel. Brit. Mus., 1889, p. 95 (China; Japan).—Werner, Abh. Bayer. Akad. Wiss. (Muenchen), II Klasse, XXII, Pt. 2, 1904, p. 353 (Shanghai and Hankow, China).—Clemmys v. Strauch, Chenol. Stud., 1862 (p. 104); Mém. Acad. Sci. St. Pétersb. (7), XXXVIII, No. 2; 1890, p. 74 (China; Chemulpo, Korea).—Sclater, Proc. Zool. Soc. London, 1873, p. 517 (Ningpo).
- 1840. Emys vulgaris picta Schlegel, Abbild. Amph., p. 127, pl. XLII (typelocality, Japan; types in Leiden Mus.; Buerger, collector) (not E. picta of Schweigger).
- 1851. Emys japonica Duméril, Cat. Méth. Rept. Mus. Paris, I, p. 8 (Japan); Arch. Mus. Paris, VI, 1852, p. 220 (not E. vulgaris japonica of Schlegel).
- 1873. Damonia unicolor Gray, Ann. Mag. Nat. Hist. (4), XII (p. 78)(type-locality, Shanghai, China; types in Brit. Mus.; R. Swinhoe, collector).—Clemmys unicolor Sclater, Proc. Zool. Soc. London, 1873, p. 517, pl. xliv (correct type-locality, Ningpo).—Hilgendorf, Sitz. Ber. Ges. Naturf. Fr. Berlin, 1880, p. 111 (Japan).
- 1889. Damonia recvesii var. unicolor Boulenger, Cat. Chel. Brit. Mus., p. 96 (Shanghai: [probably Ningpo, Sclater, Proc. Zool. Soc. London, 1873, p. 577]).—Werner, Abh. Bayer. Akad. Wiss. (Muenchen), II Klasse, XXII, Pt. 2, p. 353 (Hankow, China).
- 1891. Emys? sinensis Okada, Cat. Vert. Japan, p. 72 (Osaka) (not of Gray).

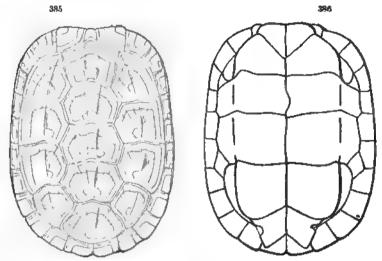
Description.—Male; U.S.N.M. No. 21181; Seoul, Korea; August, 1883; P. L. Jouy, collector (figs. 385–388). Snout rather pointed, strongly projecting, vertical profile oblique; edges of jaws not denticulated, upper jaw without hooks or median notch; triturating surface of upper jaw broad, without any longitudinal ridge; mandibular symphysis slightly longer than eye slit; anterior part of head covered by a large smooth shield on crown and snout, another on each side covering the whole temporal region, and the usual rostro-labial shield; parietal and auricular regions covered by small polygonal

^a Proc. Zool. Soc. London, 1869, p. 193.

b For Mr. John Russell Reeves, jr., who collected the type.

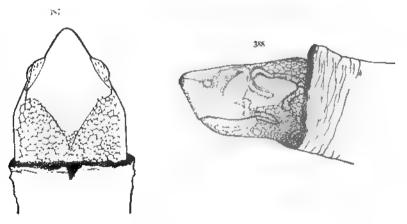
c Reproduced in this work on Plate XXX.

shields, most of those on the former with a central rounded tubercle; body moderately depressed, its depth being less than half the length, but considerably more than half the width of the carapace; carapace with nearly parallel sides, and three strong keels; shields with deeply



Figs. 385-386.—Geoclemys reevesil. $\frac{1}{2} \times$ nat. size 385, carapace; 386, plastron. No. 21181 U.S.N.M.

cut concentric lines, radiating lines also fairly strong; nuchal small narrower in front, emarginate behind, as long as broad; first vertebral pentagonal, broader in front than behind, not broader than the others



Figs 387-388. Geoglemys reflected by that size of nead 68 side of nead 80.

which are of subequal width and of the same width as the anterior three costals; edge of marginals from third to eighth turned up; posterior marginals not projecting their corners so that the posterior outline of the shell is nearly even, not servated; minth marginal broad-

est; plastron very slightly concave, angularly notched behind, truncate in front, bridge angle rounded, shields nearly smooth; posterior lobe slightly longer than bridge, nearly as wide as opening of the shell; abdominal seam longest, but only slightly longer than femoral, less than humeral and gular together; femoral longer than pectoral; gular seam longer than anal, humeral shortest; inguinal shield larger than axillary: toes webbed to the tips; tail tapering, somewhat compressed at tip. Color (in alcohol). Carapace chestnut brown, the median keel blackish brown; a small darker brown pentagonal spot on the areola of each costal above the lateral keel; vertebrals and transverse edges of costals narrowly outlined with vellow; shields of underside blackish brown with all seams and outer edge of hind lobe of plastron edged with buff, the median seams broadly so; head, neck, and limbs tawny olive, a number of yellow, black-edged stripes and vermiculations on side of head, the principal being supratemporal line; a medio-temporal line; a preauricular line; a line posteriorly on both lips and surrounding the angle of month; a small spot in front of eye; several irregular lines and spots on lower jaw, neck with numerous longitudinal lines of occillated, dull buff spots; limbs and tail without distinct markings, though on underside of thigh there are indications of lines of spots similar to those on neck.

Innensions	
	7R 2F)
Greatest length of carapace.	. 122
Greatest width of carapace	87
Greatest length of plastron	119
Length of hind lobe of plustron	44
Width of hind lobe of prastron	53
Width of bridge,	12
Depth of shell	73
Width of head	21
Length of tail from vent	37

Variation. The specimens examined by me offer but very insignificant variations in structure as well as in coloration. The latter, however, is not constant, and specimens, more or less uniform black, occur both in China, where they have given rise to "Damonia unicolor," and in Japan. The specimens from the latter country, which Schlegel described as Emys radgaris picta seem to belong to this color variety, but the yellowish marks on side of head and neck were very conspicuous. That perfectly uniform black ones occur in Japan also seems certain from Hilgendorf's notes on a specimen of "Chings unicolor," which he purchased alive in Tokyo, and which had "neck head... plain dusky without any kind of markings."

Habitat Eastern and southern China, Korea, and southern Ja In China it is known from Tientsin to Canton and in the inteat least as far as Hankow. It is also reported from Cochin China Its occurrence in Korea was first recorded by Strauch from a specimen collected by Doctor Bunge at Chemulpo in 1890 and now in the museum of the St. Petersburg Academy (No. 7907). Two other specimens from Korea, only one of which has a definite locality, are in our museum collected by Jouy and Bernadou, respectively.

In Japan it seems to be rare and is probably restricted to the southern part. It was the first addition to the herpetological fauna of the country after the publication of the Fauna Japonica, and was made public by Schlegel himself (as Emys vulgaris picta) from three specimens collected by Mr. Buerger, probably in Kiusiu. Since then but few Japanese specimens have been recorded, mostly without definite localities. I myself have only examined one from Kagoshima, Satsuma, in Kiusiu. In the Hamburg Museum there are several specimens collected by Doctor Lenz, in 1896, in the province of Setsu, Hondo (No. 188). Okada records a turtle from Osaka as Emys?sinensis which probably is the present species. British Museum has it from Tsushima collected by Holst.

List of specimens of Geoclemys recresii.

US NM No	Sex and age	Locality	When collected	By whom cofferted.	bength of carapace	Welth of carapace.	Length of plastron.	Width of hind lote.	Width of bridge.	Depth of shell.	Fatt, from vent.
14512	Mr. 14	k ger		I B Beriep in	тт 10ъ			15 m	mm 34	10 19 43	म्म स्व अप्रै
•			J.Vici						47.4	l la	- 1-7
2.481	र्ग ४ ग	Socil Kora	Veg	P July	122	87	Па	53	4:2	53	37
			1891							1	
21249	Young b	Bering Isaand)	Sej t	N. A. Grebintske			•			-	

a Description in 497 figs 385-388

Genus GEOEMYDA Gray.

- 1834. Georgida Guax. Proc. Zool. Soc. London, 1834. p. 100 (type, Testudo spengleri)
- 1836. Geograps Bonaparts, Chelon Tab. Anal., p. 6 (emendation) same type).
- 1855 Alcocia Greey, Cat. Shield Rept. Brit. Mus., I. p. 47 (same type)
- 1869. Melanochelys Gray, Proc Zool. Soc. London. 1869. p. 187 (type, M. trijuga). 1876. Chaibassia Theoreyen, Cat. Rept. Bru. India (p. 6) (type. Ch. tricarinata).

The reason for adopting the name *Geoemyda* instead of *Nicoria* for the present genus is the fact that G, spengleri was specifically designated as the type when the genus was first established as demonstrated by me in detail on a former occasion h

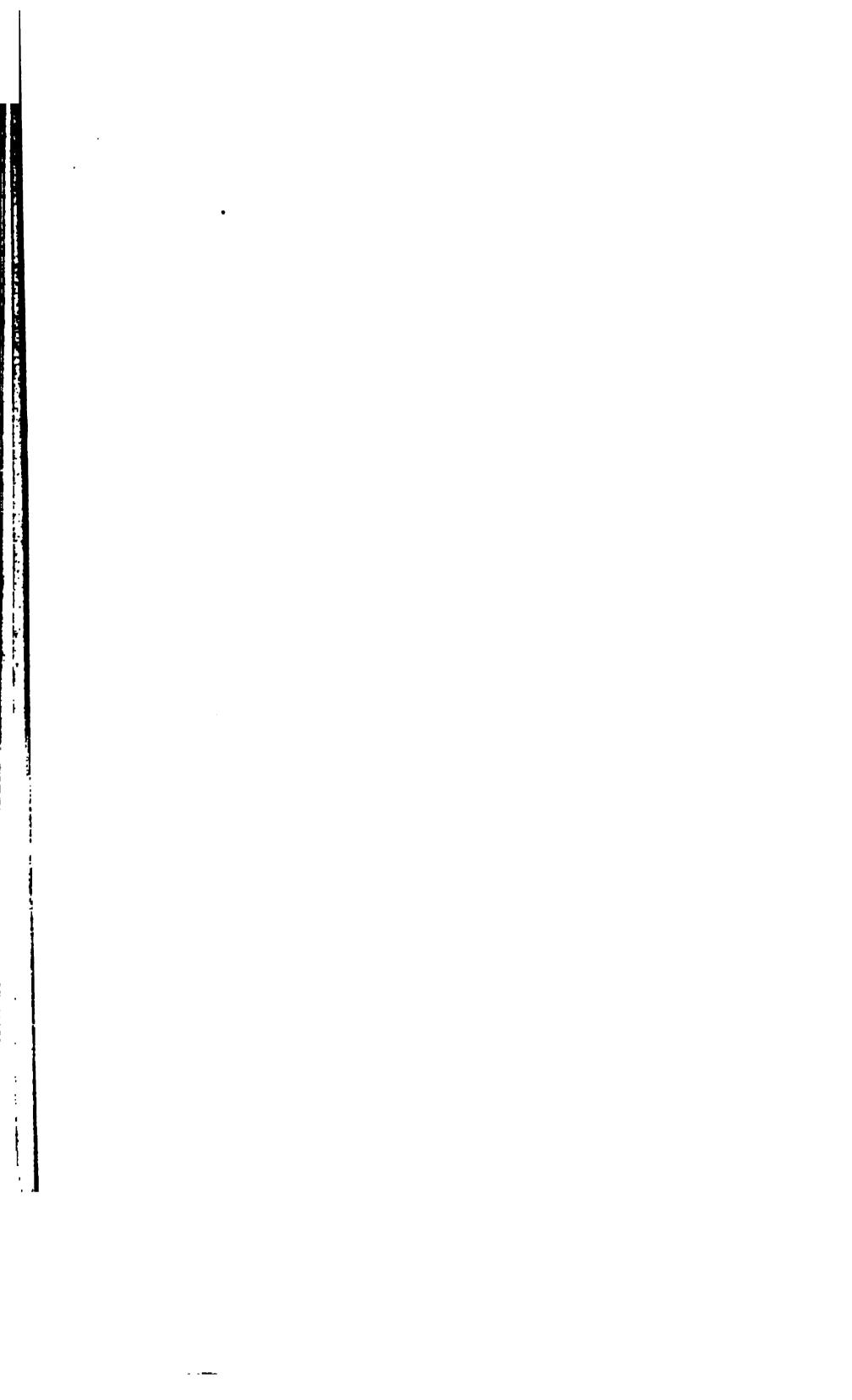
³ Thrown out by the sea

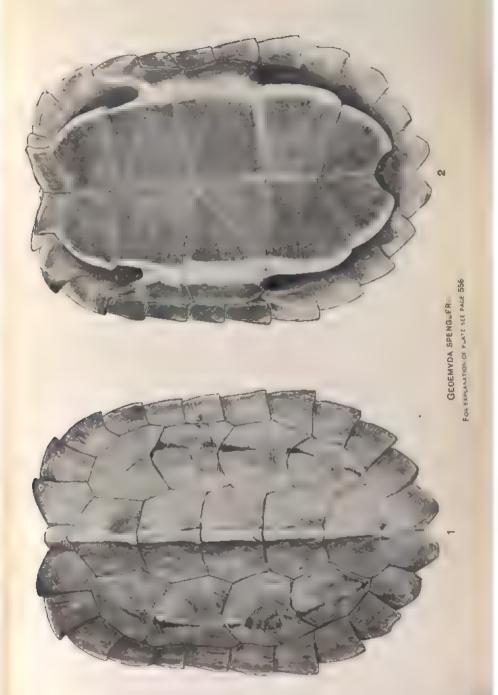
ⁿ From μ n earth land and emyda for emas, from ε u ν s, turtle

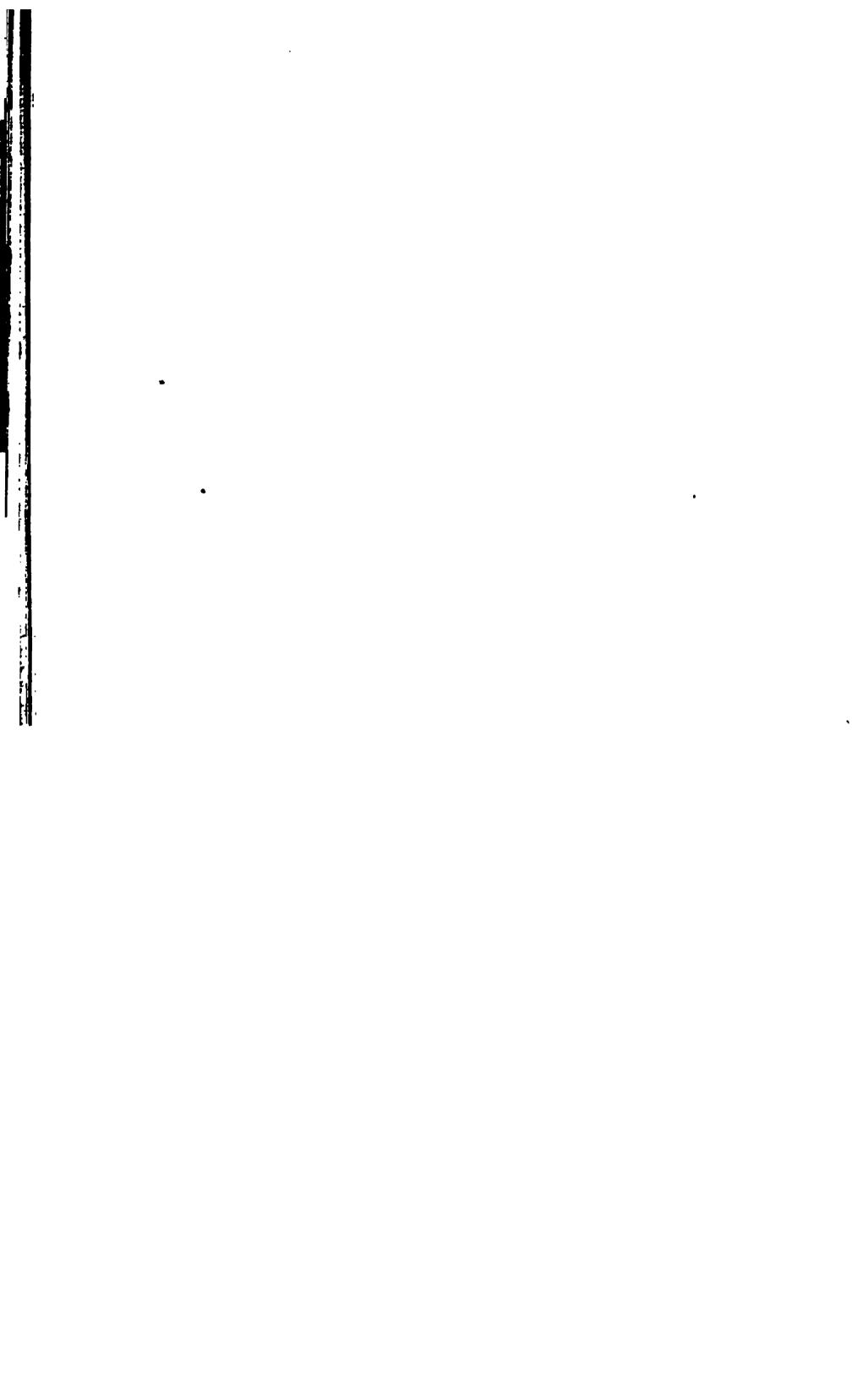
b Proc. Biol. Soc. Washington, XV, Dec. 16, 1902, pp. 237–238.



GEOFMYDA SPENGLERI.







GEOEMYDA SPENGLERIa (Gmelin).

YAMA GAME (in Okinawa dialect, according to Okada).

Plates XXXI and XXXII.

- Testudo spengleri Gmelin, Syst. Nat., I, Pt. 3, p. 1043 (no locality given).—Geoemyda spengleri Gray, Proc. Zool. Soc. London, 1834, p. 100 (China).—Nicoria spengleri Gray, Cat. Shield Rept. Brit. Mus., I, 1855, p. 17 (China).—Boulenger, Cat. Chel. Brit. Mus., 1889, p. 120 (Sumatra; Borneo; southern China?); Ann. Mag. Nat. Hist. (6), X, Oct. 1892, p. 302 (Okinawa); Proc. Zool. Soc. London 1893, p. 237 (Okinawa).—Fritze, Zool. Jahrb. Syst., VII, 1894, p. 859; author's separate, p. 10 (Tokuchimura, Okinawa).—Emys? spengleri Okada, Cat. Vert. Japan, 1891, p. 72 (Okinawa shima).
- 1802. Testudo serrata Shaw, Gen. Zool., III, Pt. 1, p. 51, pl. 1x, fig. 2 (no locality given).
- 1804. Testudo tricarinata Bory de St. Vincent, Voy. Iles d'Afrique, II (p. 308, pl. xxxvii, fig. 1).

Description.—Female; U.S.N.M. No. 34053; Naha, Okinawa shima; A. Owston collection. Snout short, not projecting, lateral profile vertical, straight; edges of jaws not denticulated, upper jaw hooked medially, without lateral notches; triturating surface of upper jaw narrow without any longitudinal ridge; mandibular symphysis shorter than length of eye slit; head above covered with smooth skin; body rather depressed, its depth being somewhat more than half the width; carapace slightly wider behind, considerably emarginate in front; three well-developed keels; shields (very badly eroded) with distinct concentric lines; nuchal large, broader behind than in front, broader than long; first vertebral pentagonal, slightly broader in front than behind, as long as second and slightly longer than third and fourth, all somewhat broader than long, and as broad as the adjacent costals; edge of marginals from third to eighth slightly turned up; anterior and posterior marginals with their posterior corners greatly projecting, so as to make the anterior and posterior outlines of the shell strongly serrate; first and second marginals broadest; plastron flat, deeply emarginate behind, very obtusely angulate in front with outer anterior corners of gulars projecting; bridge angle gently rounded, shields smooth; posterior lobe slightly longer than bridge, as wide as opening of shell; abdominal and pectoral seams subequal, longest, as long as humeral and gular together, the latter shortest; femoral seam longer than anal, which in turn is longer than humeral; axillary shield distinct, moderate; inguinal shield wanting; forearm anteriorly with large scales the tips of which are pointed and projecting; web between toes emarginate; tail short, rather broad, depressed, with seven pairs of flat square shields on upper surface toward the tip; base of tail and posterior aspect of

^a For Lorentz Spengler, intendant of the Royal "Kunstkammer" in Copenhagen, from whom Wahlbaum received a shell of this species. Spengler was a conchologist of note. He was born in 1720 and died in 1807.

femur with numerous long, blunt spines. Color (in alcohol): Carapace tawny ochraceous more or less clouded with darker brown; underside black, margins of plastral lobes, bridge angle as well as larger or smaller areas on underside of marginals wax-yellow; head on top dark tawny olive; an indistinct band on canthus rostralis, lower eyelid and on supratemporal region as well as entire neck above pale isabella-color; sides and underside of head and neck blackish with several more or less well-defined, pale isabella-colored markings, viz, a narrow postocular line over tympanic region to sides of neck, a line on posterior half of upper lip crossing the lower jaw at angle of mouth and an irregular broad mark on throat with branches on lower jaw and anterior neck; horny jaws pale brownish; limbs with a couple of ill-defined stripes of same color, and tail above similarly pale.

Dimensions.

	mm.
Greatest length of carapace	. 128
Greatest width of carapace	. 84
Greatest length of plastron	
Length of hind lobe of plastron	
Width of hind lobe of plastron	
Width of bridge	. 38
Depth of shell	. 49
Width of head	. 21
Length of tail from vent	. 24

Variation.—Boulenger, in Chinese specimens, notes the following sequence in the length of the plastral shields, beginning with the largest: Abdominals, femorals, pectorals, humerals, anals, gulars, while our specimen from Okinawa shima and the specimen from Ishigaki shima in the Kumamoto school show the following sequence with regard to their plastral seams, beginning with the longest: Abdominal = pectoral, femoral, anal, humeral, gular. Boulenger also notes the axillary shield as absent, while in ours it is very distinct and well-developed.

Habitat. -The distribution of this species is still of considerable uncertainty, as specimens with undoubted and explicit localities are rare in collections. It is said to occur in Borneo and Sumatra, as well as in southern China. It is not recorded from Formosa, but on the other hand has been received from the Riu Kius.

Holst sent two specimens from Okinawa to the Zoological Society in London, and Doctor Fritze obtained three specimens at Tokuchimura on the west side of Okinawa shima. The Imperial Museum, Ueno Park, Tokyo, also has a specimen from Okinawa, and recently the United States National Museum has obtained, through Mr. Owston, a specimen from Naha (No. 34053).

Professor Ijima has sent me excellent drawings of a specimen belonging to the Kumamoto Higher Middle School. It was collected in Ishigaki shima of the Yaeyama subgroup in February, 1893.

List of specimens of Geoemyda spengleri

t 8 NM Sex No	Crendly	When By whom cot collected cr from lected whom received	Length of carapac	Wielth of earspace	Length of plastro	2 2 2	Tall, from vent.
34053 Female 4	Naha, Okinawa	\ • twston	mm 128	79 Pt	20102 113	mm mm m 59 38	m mm 19 24

a Description ip 301

Genus CYCLEMYS" Bell.

- 1830. Sternothaerus Wageers, Nat. Syst. Amph., p. 137 (type, S. trifasciatus) (not. of Bell, 1825)
- 1834. Cyclemys Rell, Proc. Zool. Soc. London, June, 1834, p. 17 (type, C. orbi-
- 1855. Cuira Gazy, Cat. Shield Rept. Brit. Mus., I. p. 41 (type, C. amboinensis).
- 1863. ('istoclemmas Gray, Proc. Zool. Soc. London, 1863, p. 175 (type, C. flavo-marginata)
- 1863. Pyriclemmys Gray, Proc. Zool, Soc. London, 1863, p. 176 (type, Cuora trifusciata
- 1870. Cystoclemmys Grav., Suppl. Cat. Shield Rept. Brit. Miss., p. 20 (emendation

CYCLEMYS FLAVOMARGINATAb Gray.

Plate XXXIII.

- 1863 Cistoclemmys davomarquata Guar Proc Zool See London, 1863, p. 175
 type-locality, Tamsur Formosa type in Brit Mus., Swinhoe, collector,
 Swithole, Ann. Mag. Nat. Hist. (3), XH. 1863, p. 220 (Tamsur Chora
 daromarguata Guerrier, Rept. Brit. India, 1864, p. 13. pl. v. fig. Ac.,
 Tamsur). Cystoclemmys flavomarguata Grav. Suppl. Cat. Shield Rept.
 Brit. Mus., 1870, p. 20 (China Formosa). Cyclemys flavomarguata
 Rouleiger, Cat. Chel. Brit. Mus., 1889, p. 135 (Tamsur, Formosa,
 China").
- 1891. Caora umboinenas Okada, Cat. Vert. Japan, p. 72 (Yaeyama) (not of Daudin). -Emys amboinenas Frieze. Zool. Jahrb. Syst., VII, 1894, p. 864, author's separate, p. 15 (Yaeyama).

Description Adult temale: U.S.N.M. No. 34077; Ishigaki shima, Riu Kiu Archipelago; 1899; A. Owston collection. Snout short, not projecting, lateral profile vertical, straight; edges of jaws not denticulated, upper jaw feebly hooked mesially, without notches; triturating surface of upper jaw moderately wide, without any longitudinal ridge; mandibular symphysis shorter than length of eye slit; head above covered with smooth skin; body not at all depressed, its depth being considerably more than one-half its width; carapace slightly

[&]quot;From Kikkos, circle ines, river turtle

b Sign, fying margined with yell iw

c Reproduced in this work on Plate XXXIII

wider behind the middle, not emarginate in front; a well-developed vertebral keel and an interrupted keel on each side dividing the costal areoles; shields with small areoles and wide margins with numerous deeply cut concentric lines; nuchal rather large, broader behind than . in front, longer than broad; first vertebral somewhat narrower than the others, and like these, with the exception of fifth, angularly emarginate behind; second vertebral slightly longer than broad, longest, the others broader than long, all except fifth narrower than the adjacent costals; sixth to tenth marginals broadest, first slightly narrower; lateral edge slightly turned up; none of the marginals extending beyond the others, the whole outline being entire, not serrate; plastron flat, each shield with deep cut lines, rounded behind and in front; a ligamentous hinge between pectoral and abdominal shields; plastron fastened to carapace with ligament and as wide as opening of shell; abdominal seam longest; anal seam slightly longer than pectoral, which equals humeral and gular seams together; humeral and femoral seams very short, the last one shortest and less than onefourth the anal seam; axillary present, but inguinal shield wanting; forearm apteriorly with a few large scales, with free, not pointed, edges; digits with a slight web at base; base of tail and posterior aspect of femur with numerous blunt tubercles. Color (in alcohol): Carapace blackish brown, each areole bright chestnut, median keel from middle of second vertebral backward bright buff: plastron uniform blackish brown, marginals underneath and a narrow outer margin on abdominal and pectoral shields pale buff; top of head dark drab, parietal region exteriorly and posteriorly narrowly edged with black, a narrow black-edged bridge of drab on the median line posteriorly joining with the isabella-color of the neck; sides of head pale reddish gray; a narrow black line from upper corner of eye widening backward and bordering beneath a broad pale band, which surrounds the sides and posterior outline of the dark parietal region; the pale, dark-edged band is faintly indicated in front of the eye on the canthus rostralis; neck isabella-color, with indications of longitudinal buff, dark-edged stripes; legs dull ochraceous underneath, palms and soles dusky; tail isabella-colored, with a dusky, longitudinal band on each side and a dusky line on the middle line above and below.

Dimensions.

	雅悦
Greatest length of carapace	124
Greatest width of carapace	92
Greatest length of plastron	121
Width of hind lobe of plastron	
Depth of shell	58
Width of head	21
Length of tail from vent	20



Variation.—As in many other turtles with deeply carved shields there is great variation in the intensity of the sculpturing. Thus No. 34076, also a female but a few millimeters longer than the one described above, is entirely smooth underneath and nearly so above. Otherwise there is but little noteworthy variation in the four specimens before me. In the largest one just mentioned, the femoral seam is slightly longer than the humeral, and the posterior half of the anal seam has become obliterated; in the two younger specimens the pectoral seam is relatively somewhat shorter than in the two adults inasmuch as it does not equal the length of the humeral and gular seams together. All four are practically alike in color.

Habitat.—This species has been recorded from southern China as well as from Formosa, though some doubt has been expressed as to the correctness of the Chinese habitat.

Swinhoe found it to be frequent in the Tamsui River, northern Formosa, where according to him it is the prevailing species.^a

Four specimens recently acquired by the U. S. National Museum from Mr. A. Owston show that this species also occurs in Ishigaki shima of the Yaeyama subgroup of the Riu Kiu archipelago.

The *C. amboinensis* of Okada and Doctor Fritze, said to occur in the Yaeyama group, is undoubtedly meant for the present species. Doctor Fritze states that from the latter islands it is occasionally brought to Okinawa shima.

U.S. N.M. Bex and age.	Locality	When collected	10	y whom eted of fe hom recel	0731	Length of carapace.	Width of carapare.	Length of plantron.	Width of hind lobe.	Depth of shell	Tall, from vent
		Į				101.161	771 775	रग ल		mm	
24076 Female	ishigaki shima, Riu Kiu	1980	A	Owston		131	93	125	73	541	19
34077do.+.	dn	1999 -		da		124	92	121	69	58	20
24078 Halfgr	4n	1899		do		92	78	92	58	47	
3679 Young .	do	1169		do		69	58	6.5	38	31	13

List of specimens of Cyclemys flavomarginata.

Description, p. 533.

a" Swinhoe has frequently seen the Tamsui tortoise showing its head and the top of its back on the surface of the water in ponds about the rice-fields, and has watched them basking, several at a time, on the top of large stones in such ponds." (Gray, Suppl. Cat. Shield Rept. Brit. Mus., p. 20).

Family CHELONIIDÆ.

Hard-shelled turtles with paddle-shaped limbs.

A small group of half a dozen species inhabiting the tropical and subtropical seas, often found hundreds of miles from land, but resorting to sandy beaches in order to deposit their numerous round eggs. Full-grown individuals reach an enormous size, 7 feet in length and weighing 800 to 900 pounds. Some species—for instance, the green turtle—are highly esteemed as food, while another furnishes the true "tortoise shell" of commerce.

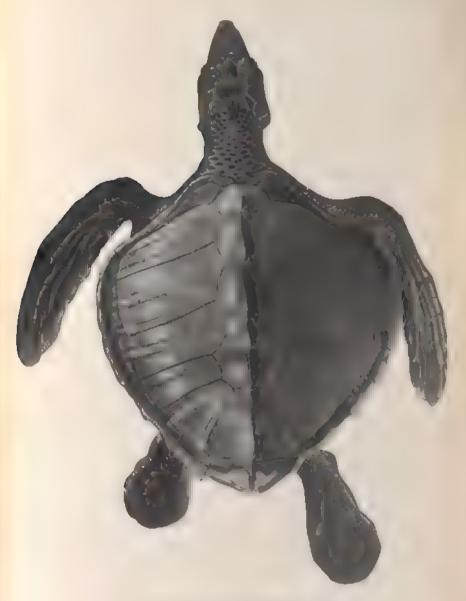
Our knowledge of the marine turtles has advanced very little since the time when Doctor Guenther treated of them in his Reptiles of British India (1864). Boulenger, in his Catalogue of the Chelonians in the British Museum (1889), regards the species which are treated of in the present work as identical with the Atlantic forms, though under the loggerhead turtle he makes the admission that the enormous variation in a large series "leaves no alternative but to further multiply the number of species or to admit only one." It is not impossible that he found similar alternatives in the other species. My own material is too limited to decide the status of these forms, and under these circumstances I consider it much more rational to enumerate the West Pacific forms under names corresponding to those employed by Guenther and Garman. Such a treatment is much less calculated to cause confusion than the opposite one of joining together those which are not with certainty known to belong together.

Dr. R. A. Philippi, of Santiago, Chile, has recently described a number of new marine turtles from that country, but the descriptions are not sufficiently explicit to justify any judgment as to their actual status. Under these circumstances no attempt has been made to correlate any of these new names with those of the marine turtles of the western and northern Pacific.

Only one species of each genus being known to occur within our territory, the key to the genera becomes a key to the species at the same time.

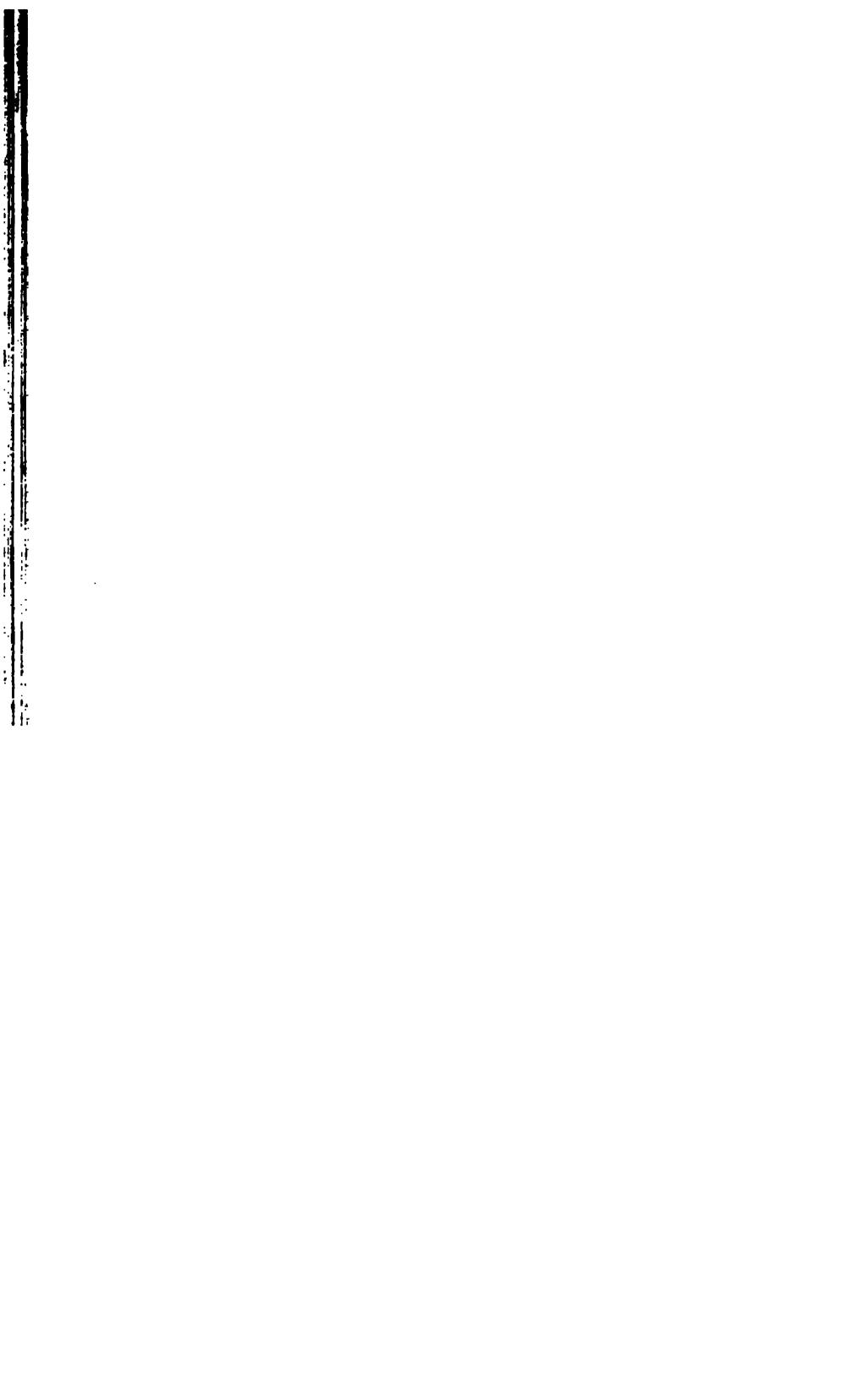
KEY TO THE GENERA AND SPECIES OF CHELONIID FOCCURRING IN JAPANESE WATERS.

- - b. Two pairs of prefrontal shields..... Eretnochelys squamosa, p. 511.



CARETTA OLIVACEA. (FROM ESCHSCHOLTZ)

FOR EXPLANATION OF PLATE SEE PAGE 556.



Genus CARETTAª Rafinesque.

- 1814. Caretta Rafinesque, Specchio Sci. (Palermo), II, no. 9, 1 Sett., 1814, p. 66 (type, C. nasuta=Testudo caretta).
- 1835. Thalassochelys Fitzinger. Ann. Wien Mus., I, p. 121 (type, Testudo caou-ana = T. caretta).
- 1838. Caouana Cocteau in Sagra's Hist. Fis. Pol. Nat. Cuba, IV, Rept., p. 31 (type, Chelonia cephalo=T. caretta).
- 1843. Lepidochelys Fitzinger, Syst. Rept., p. 30 (type, Chelonia olivacea).

The necessity for adopting Rafinesque's Caretta for the present genus has already been pointed out by me in my Herpetology of Porto Rico.^b

CARETTA OLIVACEA c (Eschscholtz).

AKAUMIGAME.

Plate XXXIV.

- 1829. Chelonia olivacea Eschscholtz, Zool. Atlas, Pt. 1, p. 2, pl. III d (type-locality, Manila Bay, P. I.)—Caretta olivacea Rueppell, Neue Wirbelth. Abyssin., 1835 (p. 7, pl. III).—Thalassochelys olivacea, Strauch, Chelon. Stud., 1862, (p. 63).—Garman, Bull. U. S. Nat. Mus. No. 25, 1884, p. 301 (Tropical Pacific and Indian oceans).—Caouana olivacea Gray, Cat. Tortois. Brit. Mus., 1844, p. 53 (Philippine Isls.).—Guenther, Rept. Brit. India, 1864, p. 52 (seas of Philippine Ils. and of China).—Lepidochelys olivacea Girard, Herpet. U. S. Expl. Exped., 1858, p. 435.
- 1831. Chelonia caretta \(\beta \) olivacea Gray, Synops. Rept., I, p. 54 (China).
- 1835. Chelonia dussumierii Duméril and Bibron, Erpét. Gén., II, p. 557 (coast of Malabar; types in Paris Mus.).—Duméril, Cat. Méth. Rept. Mus. Paris, I, 1851, p. 25.
- 1857. Lepidochelys dussumieri Girard, Herpet. U. S. Expl. Exped., p. 437.
- 1880. Thalassochelys corticata Hilgendorf, Sitz. Ber. Ges. Naturf. Fr. Berlin, 1880, p. 112 (Japan) (not of Girard, 1858).
- 1891. Chelonia caouana Okada, Cat. Vert. Japan, p. 72 (not of Schweigger, 1814) (Awa, Hondo; Toza; Bonin Is.).—Mitsukuri, Zool. Mag., Tokyo, III, no. 35, Sept. 1891, p. 364 (breeding habits, etc.); Journ. Sci. Coll. Tokyo, VI, 1893, p. 227 (Sagara, prov. Totomi), X, Pt. 1, 1896, pp. 11, etc. (embryology).

The Asiatic loggerhead turtle is easily distinguished from the other marine turtles of the Far East by having more than four pairs of costal shields. Like the hawksbill it has two pairs of prefrontals, but the shields on the carapace are not imbricate. The figure of the young Atlantic loggerhead will help placing any specimen of the group in the proper genus, but it should be remembered that the vertebral and costal shields in *C. olivacea* are apt to be more numerous. No

^a The name Caret (new Latin *Caretta*) according to Lacépède is the one by which the hawksbill turtle is generally known in the country it inhabits. Carey is Spanish for tortoise shell.

b Report U. S. Nat. Mus., 1902, p. 714.

c Signifying olive-colored.

d Reproduced in this work on Plate XXXIV.

authentic specimen from Asiatic waters is in our collection, hence no detailed description is feasible at present. (Figs. 389–392.)

Habitat.—Notwithstanding the fact that the present species is not included in the list of Japanese reptiles in the Fauna Japonica, it is

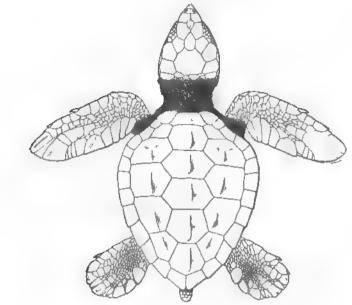
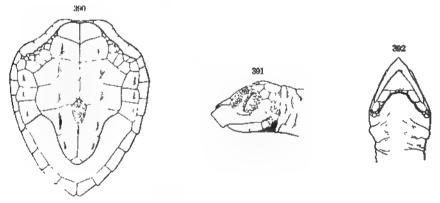


Fig. 399 -- Caretta Caretta, Young Nat Size. Entire animal from above. No. 14823, U.S.N.M.

probably the most common of the marine turtles in that part of the world. Professor Mitsukuri writes that this species "deposits its eggs



Figs 200 802 Caretta caretta young nat, size 300, shell from below; 391, head from side 382, underside of head No 11823, U.S.N.M.

on almost every suitable stretch of sandy beach in the southern half of Japan during the summer months of the year." Special localities are mentioned by Okada as Awa, Hondo, and Toza, also

Bonin Islands, and Professor Mitsukuri collected a large number of eggs at Sagara, province of Totomi, for embryological studies. Dr. S. Nozawa writes me that the Pacific loggerhead occasionally straggles to Yezo.

Genus CHELONIA a Latreille.

- 1800. Chelonia Brongniart, Bull. Soc. Philom. Paris, II, p. 89 (nomen nudum).
- 1802. Chelonia Latreille, Hist. Nat. Rept., I, p. 22 (type, C. mydas).
- 1806. Chelone Brongniart, Mém. Sav. Étrang., I, p. 610 (emendation).
- 1814. Chelonias Rafinesque, Specchio Sci. (Palermo), II, No. 9, 1 Sett., 1814, p. 66 (emendation).
- 1838. Mydas Cocteau in Sagra's Hist. Fis. Pol. Nat. Cuba, IV, Rept., p. 22 (type C. mydas) (not of Fabricius, 1799).
- 1843. Mydasea Gervais, Dict. d'Hist. Nat., III, p. 457 (same type).
- 1845. Euchclonia Теснирі, Fauna Peruana (р. 22) (same type).
- 1848. Megemys GISTEL, Naturg. Thier., p. viii (substitute for Chelonia).
- 1858. Euchelys Girard, Herpet. U.S. Expl. Exped., p. 447 (type, E. macropus).

CHELONIA JAPONICA (Thunberg).

ARAUMIGAME.

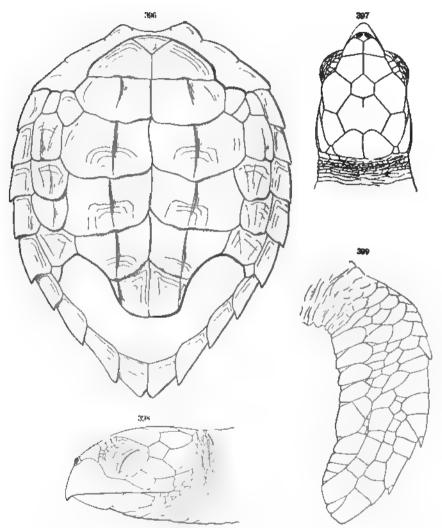
- 1787. Testudo japonica Thunberg, Svensk. Vetensk. Acad. Nya Handl., VIII, p. 178, pl. vii, fig. 1 (Japan).—Chelonia japonica Schweiger, Prodr. Mon. Chelon., 1814, p. 21.
- -1814. Chelonia virgata Schweigger, Prodr. Mon. Chelon., p. 21 (seas of the Torrid Zone).—Duméril, Cat. Méth. Rept. Mus. Paris, I, 1851, p. 24 (Indian Ocean; New Guinea).—Swinhoe, Ann. Mag. Nat. Hist. (3), XII, 1863, p. 221 (Formosa).—Guenther, Rept. Brit. India, 1864, p. 53 (Formosa).—Garman, Bull. U. S. Nat. Mus., No. 25, 1884, p. 302 (tropical portions of Western Pacific and Indian oceans).
- 1820. Carretta thunbergii Merrem, Syst. Amph., p. 19.
- 1831. Chelonia mydas 5 japonica Gray, Synops. Rept., I, p. 53 (Japan).
- 1835. Chelonia viridis Temminck and Schlegel, Fauna Japon., Rept. (part; not of Schneider), p. 18 (part; Indian Archipelago to Japan), p. 139 (Japan); pl. iv, figs. 4, 5, 6 (Indian Ocean), pl. vi, figs. 1, 2 (Moluccas).—Namiye, Cat. Spec. Vert. Educ. Mus. Tokyo, 1881, p. 84 (Ogasawara shima).—Okada, Cat. Vert. Japan, 1891, p. 72 (Bonin Is.: Koge shima).
- 1860. Chelonia mydas Hallowell, Proc. Phil. Acad. 1860, p. 486 (not of Linnæus) (Bonin Islands).—Chelone mydas Boulenger, Cat. Chel. Brit. Mus., 1889, p. 180 (part; Malay Peninsula; Formosa; Bonin Islands).

An examination of Thunberg's plate b leaves no doubt as to the identity of the sea-turtle he describes, the four pairs of costal shields and one pair of prefrontals being plainly shown and quite conclusive. The figure is not a bad one for the time and is easily identified. It has nothing to do with Caretta olivacea.

The "green" turtle is easily identified by the single pair of long prefrontal shields. The carapace has only four pairs of costal shields, like the hawksbill, but in the latter the dorsal shields are more or less imbricate, so that no confusion between the two species should occur.

a From χελώνη, turtle.

b Svensk, Vetensk, Acad. Nya Handl., VIII, 1787, pl. vii.



Figs 780 PM. Eretmochelis imbricata. § 5 Nat Size. 396 Shell from beenw. § X Nat Size. 397 top of heat, 398, Shoy of head, 389 right fore flipter dorsal view, (No. 25645 U.S.N.M.

Being a tropical species of wide distribution in the eastern Pacific, it is unnecessary to point out that it also occurs in Formosa.

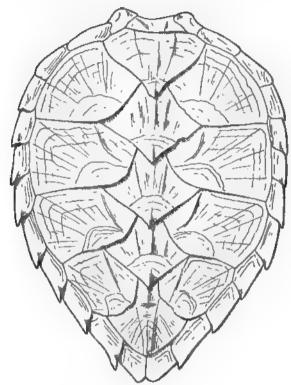


Fig. 400.—Eretmochelys impricata. 1 x nat. size. shell from above. No. 29045, U.S.N.M.

Suborder CHILOTÆ.

- 1826 Trionychoidea FITZINGER, Neue Class. Rept., p. 7.
- 1832. Chilota Wiegmann, Handb. Zool , p. 167.
- 1835. Labiata Fitzinger, Ann. Wien Mus., I, p. 107.
- 1837 Chiloti Burmeisten, Handb. Naturg., p. 731.
- 1880. Peliochelyidæ Seeley, Quart. Journ. Geol. Soc., XXXVI, p. 412.
- 1887. Diacostoidea BAUR, Zool. Anz., 1887, p. 99.
- 1889. Trionychia Zittel, Palæozool., III, p. 513.
- 1894. Mecraspedota Vaillant, Ann. Sc. Nat. (7), Zool. XVI, Nos. 4-6, p -..

This suborder consists of only one family, the soft-shelled turtles.

a From the Greek xellos, lip.

26485-No. 58-07-33

Family TRIONYCHIDÆ.

Turtles covered with a soft, leathery skin; lips fleshy; nostrils at the end of a flexible proboscis; toes webbed, with three claws.

Distributed over the warm and temperate regions of the earth, except Australia and South America, inhabiting lakes, rivers, and swamps. They are exceedingly voracious and fierce, so that they are often known as "snapping turtles." Some species reach a large size and several are highly esteemed as food. There are about 30 species known.

Genus AMYDA a Oken.

- 1816. Amyda Oken, Lehrb. Zool., II, p. 348 (type, Trionyx euphraticus).
- 1830. Aspidonectes Wagler, Nat. Syst. Amphib., p. 134 (type, T. zgyptiacus = T. triunguis).
- 1835. Gymnopus Duméril and Bibron, Erpét. Gén., II, p. 472 (substitute for Aspidonectes).
- 1835. Platypeltis Fitzinger, Ann. Wien Mus., I, pp. 120, 127 (type, T. ferox).
- 1835. Pelodiscus Fitzinger, Ann. Wien Mus., I. pp. 120, 127 (type, T. sinensis).
- 1843. Potamochelys Fitzinger, Syst. Rept., p. 30 (type, T. javanicus).
- 1844. Tyrse Gray, Cat. Tortois. Brit. Mus., p. 47 (type, T. nilotica = T. triunguis).
- 1844. Trionyx Gray, Cat. Tortois. Brit. Mus., p. 49 (type, T. ferox) (not of Geoffroy-Oken).
- 1864. Rafetus Gray, Proc. Zool. Soc. London, 1864 (p. 81) (type, T. euphraticus).
- 1864. Aspilus Gray, Proc. Zool. Soc. London, 1864 (p. 83) (type, T. cariniferus = T. cartilagineus).
- 1869. Landemania Gray, Proc. Zool. Soc. London, 1869, p. 215 (type, L. irrorata = T. sinensis).
- 1869. Fordia Gray, Proc. Zool. Soc. London, 1869, p. 219 (type, F. africana = T. trionyx).
- 1869. Callinia Gray, Proc. Zool. Soc. London, 1869, p. 221 (type, T. spiniferus).
- 1873. Isola Gray, Proc. Zool. Soc. London, 1873, p. 51 (type, I. pequensis = T. formosus).
- 1873. Ida Gray, Proc. Zool. Soc. London, 1873, p. 55 (type, I. ornata = T. cartila-gineus).
- 1873. Oscaria Gray, Ann. Mag. Nat. Hist. (4), XII, (p. 157) (type, O. swinhoei).
- 1880. Yuen Heude, Mém. Hist. Nat. Emp. Chinois, I, p. 18 (type, Y. leprosus=T. swinhoci).
- 1880. Psilognathus Heude, Mém. Hist. Nat. Emp. Chinois, I, p. 24 (type, P. lævis).
- 1880. Temnognathus Heude, Mém. Hist. Nat. Emp. Chinois, I, p. 25 (type, T. mordar).
- 1880. Gomphopelta Heude, Mém. Hist. Nat. Emp. Chinois, I, p. 27 (type, G. officinæ).
- 1880. Coclognathus Heude, Mém. Hist. Nat. Emp. Chinois, I, p. 29 (type, C. novemcostatus) (not of Hessling, 1852).
- 1880. Tortisternum Heude, Mém. Hist. Nat. Emp. Chinois, I. p. 31 (type, T. novem-costatum).
- 1880. Ceramopelta Heude, Mém. Hist. Nat. Emp. Chinois, I, p. 33 (type, C. latirostris).
- 1880. Coptopelta Heude, Mém. Hist. Nat. Emp. Chinois. I, p. 34 (type, C. septem-costata)
- 1880. Cinctisternum Heude, Mém. Hist. Nat. Emp. Chinois, I. p. 36 (type, C. bicinctum).

The reasons for the adoption of the generic term Amyda in preference to Aspidonectis or Trionyx I have advanced in my article on "Generic names of soft-shelled turtles." a

To complete the history of the name Amyda it may be added that Geoffroy St. Hilaire, in 1809, in the article creating the generic term Trionyx, says that Schweigger, in a manuscript communicated to the French "Institut," had given the name Amyda javanica to the species called Trionyx javanicus by himself. This reference might suggest to some the propriety of crediting Amyda to Schweigger, 1809, with A. javanica = (cartilaginea) for type. The result, however, will be the same as here arrived at, since the latter species is congeneric with the species above adopted as the type for Oken's Amyda.

AMYDA JAPONICA (Temminck and Schlegel).

SUPPON.

Plate XXXV.

1835. Trionyx stellatus var. japon[icus] TEMMINCK and Schlegel, Fauna Japon., Rept., p. 32, pl. v, fig. 7; pl. vii (Japan).

1835. Trionyx japonicus Temminck and Schlegel, Fauna Japon., Rept., p. 139.—
Schlegel, Abb. Amph., 1840, p. 108, pl. xxxi(rivers of southern Japan).—
Hilgendorf, Sitz. Ber. Ges. Natur. Fr. Berlin, 1880 p. 112 (southern Japan).—Mitsukuri and Ishikawa, Quart. Jour. Micr. Sci. (n. s.), XXVII, Aug., 1886, p. 17.—Okada, Cat. Vert. Japan, 1891, p. 72 (Kagoshima; Chikugogawa).—Mitsukuri. Zool. Mag. Tokyo, VII, 1895, p. 143 (oviposition); Bull. Fish. Bur. Washington, XXIV, 1905, p. 260, pls. i-iii (turtle farm).

1866. Trionyx schlegelii Martens, Preuss. Exped. Ost-Asien, Zool., I, p. 112 (Yokohama) (not of Brandt. 1857).

The status of the soft-shelled turtles inhabiting China and Formosa (A. sinensis and schlegelii), Japan (A. japonica) and Amurland (A. maackii) has not been worked out for lack of material. Boulenger who unites all three, had apparently no Japanese specimens at hand when he published his catalogue of the Chelonians. Hilgendorf, however, who had both Chinese and Japanese specimens, declares them to be different. He says that the young of A. sinensis, compared with Japanese specimens of the same age, have "a much stronger median dorsal keel and different proportions of length between the broader (basal) part of the ribs and the narrower (apical) end. The basal portion in sinensis is shorter than the apical part, but longer in japonicus."

My own material is none too conclusive, for while I have quite a number of young Japanese specimens I have only one specimen from the mainland and two from Formosa. The Chinese specimen before me is from the country between Tientsin and Peking, consequently

^a Science (n. s.), XXI, Feb. 10, 1905, pp. 228-229.

practically from the same locality whence came Brandt's type of *Trionyx schlegelii*. It follows that if Brandt's *T. maackii* from the Amur region is a distinct form, it is different from our Chinese specimen also.

The absence of specimens from the drainage of the Yangtse River, which may be supposed to represent the true Amyda sinensis, is particularly to be regretted, as it prevents me from arriving at any but the most inconclusive and preliminary results.

That my specimens represent three separable forms, however, I have but little doubt.

In the first place, in the Formosan specimens, which I call A. sinensis, the shell is evenly arched, without any depression on either side of the neural plates and without any median raised keel. The north China specimen, as well as all my Japanese specimens, agree, on the other hand, in having a well-marked depression on each side of the neural plates of the upper shell, so that a broad and blunt but very distinct keel is formed along the median line. In addition, the Formosan specimens seem to have the dermal ridges on the back smooth and continuous, while in the north China and Japan specimens the great majority of these ridges are dissolved into lines of tubercles.

To demonstrate the difference between the north China specimen, which I call A. schlegelii, and the Japanese specimens (A. japonica) the following table is presented:

Comparative measurements of Japanese and Chinese soft-shelled turtles.

,			—			
					D,rect measure—Proporti meats—measurer	
U S N. M No	Sex	Age	Localty	ફ્લોમલાન	Lav geb of cambace the other of the other plastren begth of plastren Rodt Length of carapace greathof carapace greathof	plastron Depth of
21179	Mula	4 vears		1 tanansa	mm mm mm mm 70c 3s. 1.9 43	
			apar	А јаропса		
21178	do	Зуеать	- H	do	172 98 90 28	
34057	do	do	16	d-)	Je Lo 192 33	
34068	,do	do	do	do	13J 111 204 35	
34060	. do	do	ilo	lu	128 112 95 33	
			Averag	re.	1.130 114 103 34.5 100 84	76 25
34056	Female	3 years.	Japan	A japonica	130 116 100 38	
34059		do	do	.do	140 LI6 103 43	
_ ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	٠.
			Averag	re.	135 116; 101 5 40.5 100 86	75 30
34054	Mule	4 years	Formosa	\ senensis	165 136 45 100 .	82 27
34055	Female .	do	do	do	, 130 120 118 31 100 80;	79, 34
2970 0	Male.	3 years.	N China	A schlegela	119 95 93 41 100 80	78 34
				<u> </u>	1 1	

In the first four columns I have given the exact measurements of the membranous shell, and in the last four columns I have reduced the same dimensions to per cent of the length of the membranous carapace. Although the series is small, the figures probably deserve some confidence because of their remarkable uniformity and harmony. If we examine the table, the first observation to impress itself upon us is that the males and females from the same locality differ from each other but very little in their proportions, except in the depth of the shell—i. e., the greatest distance between ventral and dorsal surfaces on the middle line measured with curved calipers, the difference amounting to 5 and 7 per cent, respectively. At the same time it should be noted that the difference between the various individuals of the same sex does not reach $2\frac{1}{2}$ per cent.

If we now compare the north China specimens with the Japanese specimens, we observe that in the males the depth of the shell of the former is 9 per cent greater than in the latter. Unfortunately we have no female specimen from northern China; but the difference between the island specimens and the mainland male is so great that the latter even exceed the females of the former by 4 per cent. The difference may be very strikingly formulated by stating that in the males of A, japonica before me the depth of the shell is one-fourth the length of the carapace, while in the male A, schlegelii it is one-third the length of the carapace.

The Formosan specimens appear to be slightly narrower and also somewhat deeper than the Japanese without even approaching the north China specimen in this respect, inasmuch as the latter, a male, presents exactly the same proportions as the female of the more southern form.

The Formosan and north China specimens agree in the lateral outline of the shell, for while in the Japanese specimens the greatest width of the body is situated more nearly at the middle, in the former the greatest width is farther back.

The material is so scant that I shall pass over another point wherein the Formosan specimens and the north China one seem to differ from the Japanese, viz, in the somewhat shorter plastron of the latter. Compared with the width of the body, the difference amounts to nearly 10 per cent; but this measurement is less satisfactory than the the others, and, as stated, the series is too small to give positive results.

It would then appear that the Japanese soft-shelled turtles are neither identical with the north Chinese nor with the Formosan forms. The question therefore naturally arises, whether it may not agree with the south Chinese species. As said before, I have no specimens for comparison, and the literature offers very little of a definite nature. Both Gray and Boulenger, examining Formosan as well as Chinese

specimens, declared them to be identical, and in default of material I accept their decision. In that case, the Japanese form must be regarded as distinct. On the other hand, I must call attention to a point which later may have a bearing upon these questions. Doctor Siebenrock, in a very interesting paper on the systematic arrangement of the Trionychidæ figures the plastral arrangement of a Trionyx sinensis (p. 821), which shows a very short plastron, especially the posterior lobe, and he calls particular attention to this feature as characteristic of T. sinensis (p. 822). The figure (see fig. 401) and



FIG. 401—ELEMENTS OF THE TRONYCHID PLASTRON.
8HOWING PLASTRAL CALLONITIES. \$\frac{3}{2} \times \text{NAT SIZE.}\$, \$PROM
SIEBENROCK \$\rightarrow\$ COMMISSURE \$\epsilon p\$\$. ENTOPLASTRON, \$\epsilon p\$\$. HYOPLASTRON \$\hat{hyp.}\$ ENTOPLASTRON, \$\hat{pg.}\$ ANTERIOR MEDIAN PROCESS, \$pm. MEDIAN PROCESS \$\epsilon p\$\$ pp. POSTERIOR MEDIAN PROCESS; \$\frac{1}{2} \times \text{XIPHIPLASTRON.}\$

description fit exactly my Japanese specimens, but unfortunately Doctor Siebenrock does not give the locality of the specimen figured. Now, on the other hand, compare the plastron of the specimens figured by Gray. It is an exact counterpart of my Formosan male (No. 34054) in every respect, even to the close approximation of the epiplastra. It is not easy to believe that Gray's and Siebenrock's figures represent the same species.

However, with no certainty as to the exact locality of the specimens figured, it is idle to speculate

upon the status of the soft-shelled turtles in China, though it would not be surprising if each of the three main river systems of that empire had its own form. This view is strengthened by some remarks by Doctor Schnee' to the effect that it is possible to distinguish between a northern and a southern type, the latter being much darker in China and with more strongly developed tubercles than the former, peculiarities which he verified on large series of living specimens in Canton and Shanghai."

Doctor Schnee in the same article (p. 207) has a note which will

⁹ Zur Systematik der Schildkrötenfamilie Trionychidæ Bell, nebst der Beschreibung einer neuen Cyclanorbis-Art, von Friedrich Siebenrock in Sitz, Ber. Akad. Wiss. Wien, Math.-Naturw. Cl., XCI, Pt. 1, Oct. 1902, pp. 807-846.

bCat, Shield Rept. Brit. Mus., 1855, pl. xxxi.

cZeitschr Naturwiss., LXXII 1899 pp 203-204

d This difference in color may be due to the character of the rivers and lakes, as already suggested by Heude (Mém. sur les Trionyx. p. 1)

have to be taken into account in all future examinations and comparisons of Japanese specimens. He says that the price of the soft-shelled turtle in Japan is so much higher than in China that a regular importation takes place from China to Japan, and that therefore he is not quite sure that the specimen which was shown him there really came from Japan. It is plain then that in order to settle the question of the status of the Japanese Amyda it will be necessary to show that specimens identical with those from China are in reality indigenous to Japan.⁴

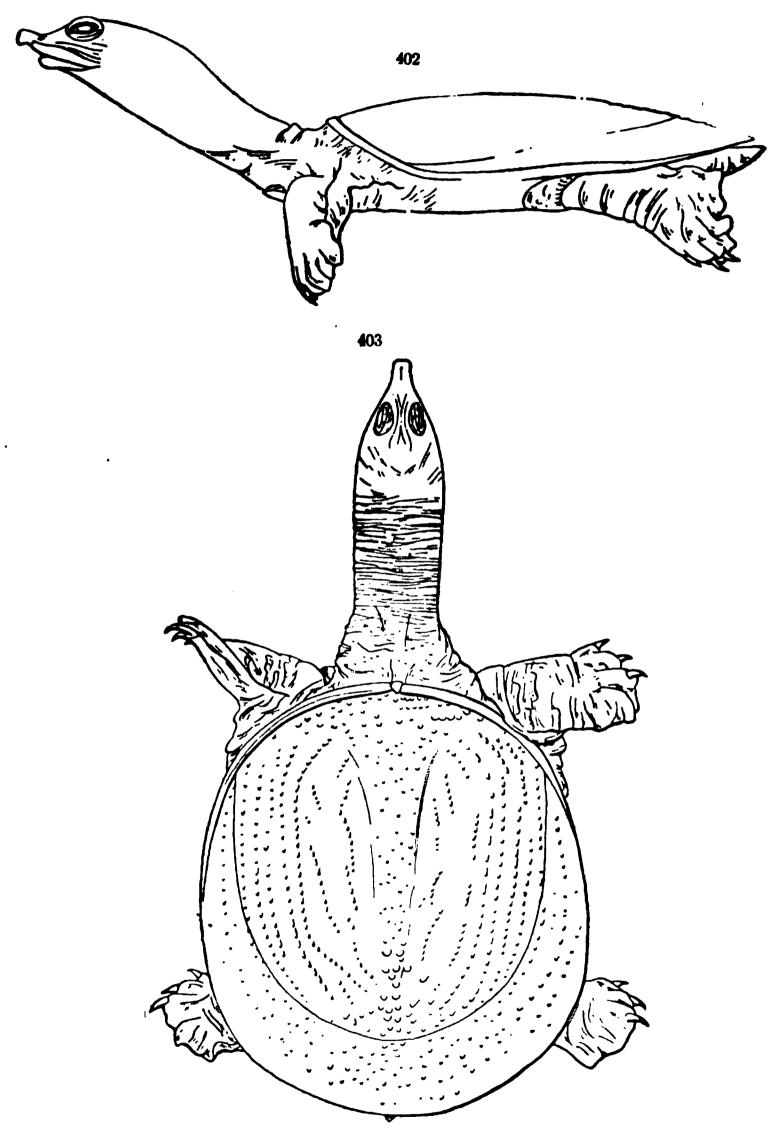
Before leaving this theme of the characterization of various forms or species confounded under A. sinensis, I wish to call the attention of future investigators to the somewhat fugitive pattern of the plastron as a possible means of distinguishing the young 2 years old and under.

Doctor Siebenrock b has described such a pattern on six specimens of A. sinensis, from Annam, scarcely a year old: "Anteriorly in the middle there is an unpaired gular spot, which is the smallest or even may be absent. The gular edge, moreover, has a black margin. Furthermore, on the hyo-hypoplastral interspace there are two spots which usually unite into a short transverse band, and behind this there is again a large unpaired spot between the xiphiplastra. Laterally there is on both sides a spot in the axillary and inguinal regions, one in front of the hypoplastron and another behind the axillary one."

I find this pattern repeated in my Japanese specimens, of which I have a large series, with one very notable exception, viz, there is a single unpaired median mark on the hyo-hypoplastral interspace, and not two lateral marks separated or united. I refer to Plate XXXV illustrating this series, and it will be noted that instead of "two spots, usually uniting into a short transverse band on the hyo-hypoplastral interspace," there is a large, unpaired median, triangular or broadly spear-shaped spot on the same interspace. The essential element of this large spot, the largest by far, is the median portion, which forms the anterior angle of the triangle, since this part persists even in cases where the lateral extensions have not been fully developed. The arrangement, consequently, appears to be quite the reverse of that of the Annamese specimens and is not without considerable significance,

Sitz Ber, Akad, Wiss, Wien, Math. Naturw, Cl., CXII, Pt. 1, May, 1903, p. 349.

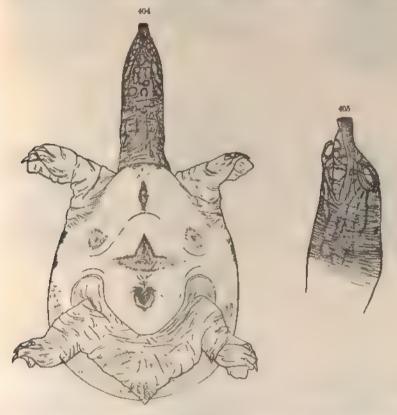
Description (figs. 402-405).—Male, 4 years old; U.S.N.M. No. 21179; Japan; Imperial Government collection. Head moderate pointed, the proboscis as long as width of interorbital space and one-half the upper eyelid; nostrils separated by a narrow septum, on each



Figs. 402-403. -Amyda Japonica. $\frac{3}{3}$ × nat. size. 402, side view: 403, view from above. No. 21177, U.S.N.M.

equals one-half the horizontal diameter of orbit; carapace oval; the iterior margin of the revolute nuchal border somewhat rugose with o small tubercles on the median line; along the median line of the

shell a raised keel anteriorly as broad as interorbital space and eyelids together, posteriorly not wider than this space plus half an eyelid; on each side of the keel a perceptible depression, the skin of the carapace with numerous more or less disrupted, raised, longitudinal lines studded with tubercles, these lines being more wavy and parallel with the axis of the body near the middle of the back, and straighter, less tubercular, and more parallel with the periphery toward the edge of the carapace; the tubercles gather into a large cluster on the nuchal



Figs 404-405. Amyda japonica. 2 Nat size. 404 underside (1) \times Nat size), 405, side of head. No. 21177, 1.8 N M

portion of the keel, and a still greater number of larger tubercles congregate near the posterior end of the bony disk and the adjoining posterior portion of the soft flap: plastron flat, smooth, the posterior lobe short, its width at base equaling one-half the length of the plastron: greatest height of body equals one-fourth the length of carapace. Color (in alcohol) above clear greenish olive, with a few indistinct brownish blotches on the carapace, underneath uniform pale buff; head with a number of narrow blackish lines, as follows: A transverse

line across anterior third of upper eyelid and interorbital space to anterior corner of eye and from there obliquely downward across the loreal region to the upper lip at the base of the proboscis; a slightly curved line from below center of eye obliquely backward above the angle of the mouth disappearing some distance behind and below the latter; a slightly curved line from posterior angle of eye above the temporal region; a short blackish streak below the eye between the last two lines; two broken lines across the middle and the posterior

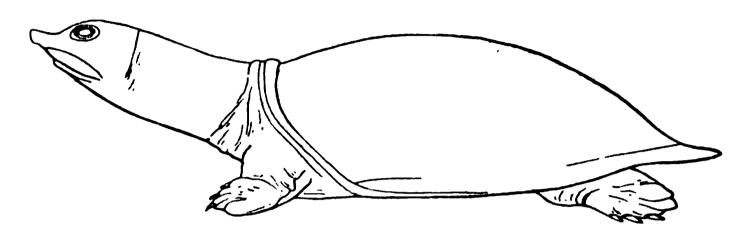


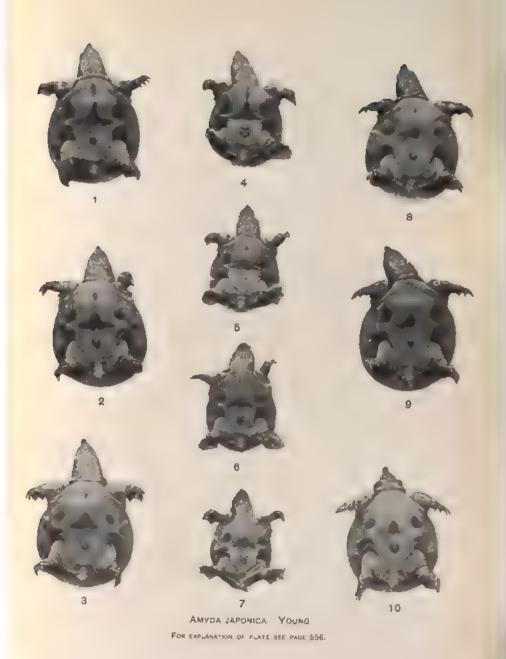
FIG. 406 .- AMYDA SCHLEGELII. SIDE VIEW. FROM GRAY'S CAT. SHIELD REPT. PL. XXXI.

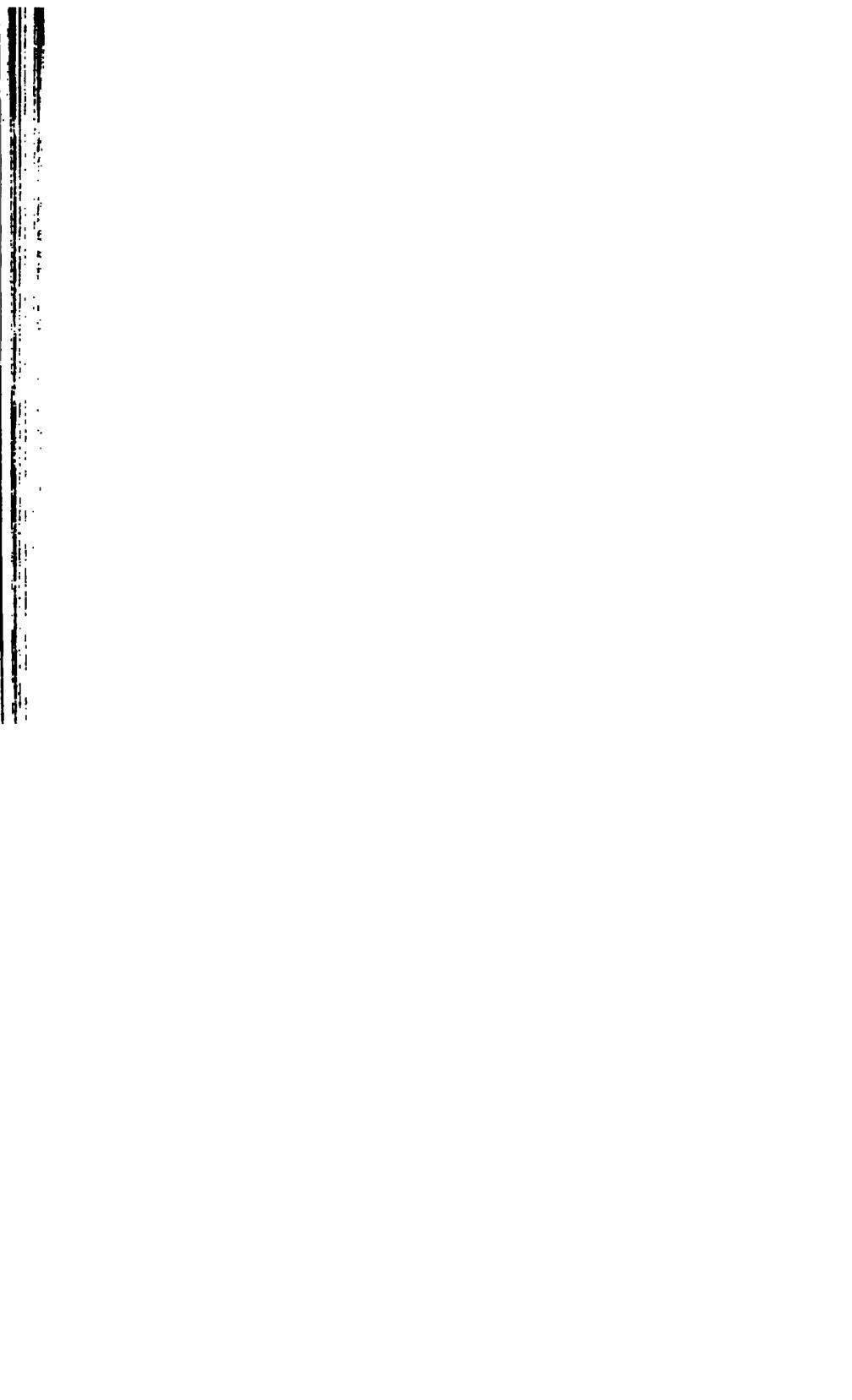
third of upper eyelid; a few broken longitudinal lines on parietal and occipital regions and a few dusky spots on snout and proboscis; lips, chin, and throat with large round buff spots surrounded by a network of blackish brown lines; sides of neck with a broad longitudinal buff band, more or less interrupted anteriorly and faintly edged with dusky; neck below this band suffused with olive and dotted with indistinct roundish pale buff spots.

Dimensions.

The females differ chiefly in proportions, being much deeper through the body and having a much shorter tail.

Young recently hatched; U.S.N.M. No. 23531; Yokohama; October, 1896; L. Stejneger, collector (plate XXXV, fig. 3). Essentially as the one described above; the anterior border of the carapace turned over as in the older specimens, but the median portion, instead of being merely rugose, is more or less regularly segmented, and the posterior edge of several of the segments tuberculated, the median segment being pushed a little ahead of the others and the tubercle occupying the upper surface instead of the posterior edge; dorsal keel very prominent. Color essentially as above, but extreme edge of





carapace devoid of color, though without a well-defined pale margin; underside with a number of symmetrical blackish spots, with slightly paler centers, as follows: (1) On plastron, a small longitudinal spot anteriorly on the median line between the epiplastra; a large triangular median spot on the hyo-hypoplastral interspace, broader than high, the apex turned forward; a heart-shaped median spot, deeply notched in front, on the anterior processes of the xiphiplastra; a pair of oval spots, one on each side in front of the bend of the hyoplastra; a pair of roundish spots, one on each side in the outer angle between the hyoplastra and the hypoplastra; (2) on the soft skin, a pair of oblique elliptic spots, one on each side behind the bend of the hypoplastra; a pair of circular spots at the base of the tail; (3) on the underside of the flap of the carapace: a longitudinal, ill-defined broad band interrupted on the median line; (4) on the extremities: palms and soles dark gray.

Dimensions.

•	mm.
Length of carapace	. 36
Greatest width of carapace	. 34
Length of plastron	. 29
Greatest depth of shell	. 12

The rate of growth is well illustrated by a table presented by Professor Mitsukuri,^a as follows:

Age.	Length.	Breadth.	Weight.
	Cm.	Cm.	Grams.
Just hatched	2. 5	2. 5	23
First year	.j 4.5	4. 2	23
Second year	. 10. 5	8.8	169
Third year	. 12. 5	10. 5	300
Fourth year	. 16.0	13. 5	563
Fifth year	17.5	15. 1	750

Habitat.—This species, as here understood, has only been found in Japan proper, where it seems to occur originally in the southern rivers only. It has probably been introduced in many places, and a detailed account of the localities in which it is undoubtedly original would be a very interesting contribution to our knowledge of these animals.

Professor Mitsukuri has given a very interesting and instructive description of Mr. Hattori's turtle farm at Fukagawa, a suburb of Tokyo, which it was my good fortune to inspect in 1896 under his guidance.

^a Bull. Fish. Bur., Washington, XXIV, 1905, p. 265.

List of specimens of Amyda japonica.

U.S. N.M. No.	Sex and age.	Locality.	When collected.	By whom collected or from whom received.
1171	Young a	Japan		Imp. Jap. Governm.
1172	do. a	đo		Do.
1173	do. a	do	• • • • • • • • • • • • • • • • • • • •	Do.
1174	do.a	do	• • • • • • • • • • • • • • • • • • • •	Do.
1175	do. a	do		Do.
1176	do. b	do		Do.
1177	do. c	do		Do.
178	Maled	do		Do.
179		do		Do.
3528	Young a	Yokohama	Oct. —, 1898	L. Stejneger.
1529	do. f	do	do	Do.
530·	do.ø	do	do	Do.
531	do. 4	do	do	Do.
532	do	do	do	Do.
533	do	do	do	Do.
534	do	· do	do	Do.
535	do	do	¹ do	Do.
536	! !do	do	do	Do.
537	do	do	do	Do.
538	1	do		
056		Tokyo		
057		do		
058		do		_ •
059		do		
060	ĺ	do,		_
061		do		Do.
		do	•	
	,	do		
		do		'
		do		i

a First year.

AMYDA SINENSIS a (Wiegmann).

- 1834. Trionyx (Aspidonectes) sinensis Wiegmann, Nova Acta Acad. Leop. Carol.. XVII. 1834. p. 189. (type-locality, paddyfield on a small island in the Tiger River, near Macao, China; Meyen, collector).—Trionyx sinensis Strauch, Chelon. Studien. 1862 (p. 177).—Swinhoe, Ann. Mag. Nat. Hist. (3). XII. 1863. p. 219 (S. W. Formosa).—Schnee, Zeitschr. Naturwiss., LXXII, 1899. p. 202 (Shanghai; Canton).—Nikolski, Zap. Imp. Akad. Nauk. S. Peterburg (8), XVII, No. 1, 1905, p. 20 (part).
- 1842. Trionyx tuberculatus Canton, Ann. Mag. Nat. Hist., IX, p. 482 (Chusan, China).
- 1844. Tyrse perocellata Gray, Cat. Tortois, Brit. Mus., p. 48 (type-locality Canton, China; types in Brit. Mus.; Cantor, collector).—Trionyx perocellatus

b Second year.

cSecond year; figs. 402-405.

d Third year.

Probably 4 years old; description, p. 520.

[/]First year; pl. xxxv, fig. 9.

g First year; pl. xxxv, fig. 2.

h First year: pl. xxxv, fig. 3; description, p. 522.

Gray, Cat. Shield Rept. Brit. Mus., 1855, p. 65 (China). Landemanna f perocellata Gray Proc. Zool Soc. London 1869 p. 216 (Formosa, Swinhoe collector), 1873 pp. 53-54 (fig. of mandibles).

1869. Landemania irrorata Gray Proc. Zool Soc London 1869, p. 216 type-

locality Shanghai China, type in Brit Mus)

1880. Psilognathus Ivvis Herne, Mém Hist Nat. Emp. Chinois, I, p. 24, pl. ii (type locality, mountain and streams south of the town of Ning-kouo fou.) 1880. Tempognathus mordae Herne, Mém Hist Nat. Emp. Chinois, I, p. 26,

pl, in (type-locality, environs of Shanghan,

1880 Gomphopella officina Het ne, Mem. Hist. Nat. Emp. Chinois, I., p. 27. pl. (v. type-locality, River Houai, where it leaves the province Ho-nan...

1880. Calognathus novem-costatus HELDE, Mém Hist. Nat Emp. Chinois, I, p. 29, pl. v (type locality eastern extremity of lake Tch'ao)

1880. Tortisternum novem contat in HEUDE Mém Hist Nat. Emp Chinois, I, p 31, pl vi (type-locality lake Teh'ao, department of Lu tcheou)

1880, Ceramopelta latirostris Her de Mém. Hist Nat. Emp. Chinois, I. p. 33, pl. vii (type-locality, environs of Ngan-k'ing fou)

1880 Coptopelta septem-cosiata Her DE, Mém. Nat. Hist. Emp Chinois, 1, p. 35, pl. vin (type-locality, lakes of Tong-heou (Ngan-houé).

1880 Cinetisternum bicinetum HE) DE Mém Hist Nat. Emp. Chinois, I, p. 37, pl. 1x (type-locality, irrigation ditches in the marsh of Ngan-k'ing n

The interesting question as to the relationship of the individuals with narrow or wide alveolar surfaces of the jaws, as illustrated by Père Heude's subdivision of the south Chinese species, can not be discussed here. It must be studied on the spot with proper regard to the possibility of complications, due to local differentiations in the various drainage systems as well as to the subsequent mixing of the latter through irrigation canals. Boulenger has suggested "a case of dimorphism caused by a difference of diet," the fish-cating individuals retaining the sharp beak of the young, while those feeding on mussels with hard shells or on other hard substances are supposed to gradually develop a broad crushing mandibular surface. He furthermore supposes such individuals to interbreed, thus preventing the characters from becoming permanent."

With regard to the identity of the Formosan and south Chinese specimens and the related question of the distinctness of the latter I

refer to the discussion under A. ja ponica (pp. 517-519).

Description. Female, 4 years old; U.S.N.M. No 34055; Tamsui River, Formosa; March, 1903; A. Owston collection. Carapace short ovate in outline; the anterior margin of the revolute nuchal border segmented toward the median line, a single tubercle on the latter in front of the border; no median keel, nor lateral depression, the carapace descending evenly to both sides from the rounded back; skin of carapace smooth, with about 24 longitudinal raised lines, which are entirely untuberculated, and nearly all straight and uninterrupted, except about three midway on each side, which are wavy and occasionally interrupted; these lines terminate near the

^o Cat. Chel. Brit. Mus., 1889, pp. 242-244.

posterior end of the bony disk in a small tubercle behind which to the end of the carapace there are numerous short raised lines similarly terminated; a couple of rows of blunt tubercles in front of the bony disk on the soft flap behind the overturned nuchal border; plastral bones more or less discernible on underside as well as the callosities, of which there is a pair on the hyo-hypoplastra and one on each of the xiphiplastra. Color (in alcohol) above dark olive slate, underneath drab; head with a few scattered blackish dots and traces of a oculo-supratemporal black line, a subocular and an anterior oculo-labial line; neck below dusky with indistinct pale spots on throat and traces of a lateral pale band; underside with a few dark blotches, the one filling the outer angle between the hypplastra and the hypoplastra as well as the median blotch on the xiphiplastra being most conspicuous; palms and soles dusky.

Dimensions.

Length of carapace	150
Createst width of common	100
Greatest width of carapace	
Length of plastron	118
Greatest depth of shell	51
Greatest width of head	29
Distance from plastron to tip of tail	48
Free portion of tail, from connection with carapace	18

The male of the corresponding age (U.S.N.M. No. 34054) differs mostly in less depth of shell and longer tail. Eight pairs of costal plates can be made out; in addition to the callosities on hyo-hypoplastra and xiphiplastra there are indications of rugosities on each arm of the entoplastron. No trace of keel or depression on carapace.

Habitat.—It is impossible at the present stage of our knowledge to indicate the precise range of this species in China. It seems to occur in all the southern rivers and in Formosa; but how far north it extends or where it meets the next species must be left to the future to clear up.

List of specimens of Amyda sinensis.

U.S. N.M. No.	Sex.	Locality.	When collected.	By whom collected or from whom received.
		Formosa		

a Probably four years old; p. 526.

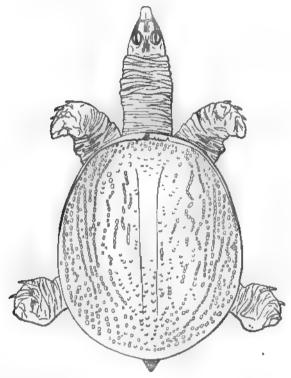
AMYDA SCHLEGELII (Brandt).

- 1855. Trionyx perocellatus Gray. Cat. Shield Rept. Brit. Mus., pl. xxxia (China) (not of 1844).
- 1857. Trionyx schlegelii Brandt, Mél. Biol. Acad. Sci. St. Pétersbourg, II, p. 610 (type-locality, Peking, China; type Mus. St. Petersb., no. 177; A. Bunge, collector).

b Probably four years old; description p. 525.

Reference has already been made to the specimen from northern China, to which I apply the above name more because the locality is the same as that of the type than because the description applies better to it than any of the others. It is quite likely that eventually A. maackii may turn out to be the same thing as the Peking form, in which case that name will take precedence. At present, however, I deem it the wisest course to enumerate them separately.

If Ford's elegant figures of the half-grown specimen in British Museum, from "China," are as accurate as they are artistic, they



Pig. 407.—Anyda schlegelii. $\frac{1}{2} \times$ nat. size. View from above. No. 29700, U.S.N.M.

probably represent an individual of the present species. The dorsal keel, the tubercular ridges, and the coloration agree completely with our north China specimen, and especially the great depth of the body as shown in the upper figure. Expressed in per cent of the total length of the carapace, the depth is nearly 36, or in excess of the corresponding percentage in our male specimen of A. schlegelii (see table p. 516).

Description. - Male, third year; U.S.N.M. No. 29700; north China, between Tientsin and Peking; 1901; M. L. Robb, collector (figs.

^a Cat. Shield Rept. Brit. Mus., 1855, pl. xxxx. Outline of upper figure reproduced in this work, fig. 406, on p. 522.

407-409). Carapace short ovate, with a broad, raised median keel and a well-marked depression on each side of the latter; anterior border turned over backward, the outer (anterior) edge being smooth,

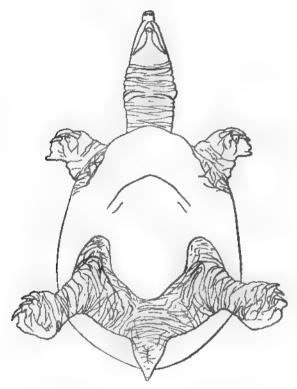


Fig. 408.—Amyda schlegeldi. $\frac{1}{2} \times$ nat. size. Underside. No. 29700, U.S.N.M.

the inner edge near the median line somewhat tuberculate with a couple of rounded tubercles on top of the rim at the middle; carapace with numerous strongly tuberculated longitudinal lines, the outer

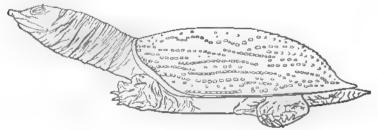


Fig. 409.—Amyda schlegelfi. 1 × nat. size. Side view No. 29700, U.S.N.M.

ones more or less continuous and parallel with the outer edge, the inner ones very irregular and interrupted; posterior end densely tuberculated, as is also the nuchal region; depth of shell about one-

third the length of carapace; plastron smooth. Color (in alcohol) above olive gray with a few small blackish spots, below pale buff, unspotted; on head a narrow black line across the interorbital space anteriorly continued below as a slightly oblique line between anterior angle of eye and edge of upper lip; a similar line behind the eye over the supratemporal region; sides of neck and throat olive with indistinct pale spots and traces of a longitudinal, lateral pale band on neck.

Dimensions.

	mm.
Length of carapace	119
Greatest width of carapace	95
Length of plastron	93
Greatest depth of shell	
Greatest width of head	21
Distance from plastron to tip of tail	43
Free portion of tail, from connection with carapace	25

Habitat.—Northern China, the specimen described being from the province of Pechili. It is impossible at the present time to determine its range even approximately.

List of specimens of Amyda schloyelii.

U. 8. N. M. No.	Sex.	Locality.	When collected.	By whom col- lected.
29700	Male a	North China	1901	M. L. Robb.

a Third year; description, p. 527; figs. 407-409.

AMYDA MAACKIIa (Brandt).

- 1857. Trionyx maackii Brandt, Mél. Biol. Acad. Sci. St. Petersbourg, II, p. 609 (type-locality, Southern Amur R. and Ussuri R.; types, Mus. St. Petersb., Nos. 3690, 4661, 5725, 5726; Maack, collector).
- 1905. Trionyx sinensis Nikolski, Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, no. 1, p. 20 (part: Ussuri, Amurland).

This form, or species, being known only from the original description of Brandt, I have appended the following translation:

Description.—Upper part of head more convex than in Trionyx javanicus, olive colored with very numerous yellow dots which are smallest on the upper surface of the face, a little larger on the sides and much larger on the throat (but with no bands or dusky spots); sides of neck with a few rough places; dorsal shield [carapace] in the middle longitudinally depressed, but subcarinate, convex at the sides, with very smooth skin ["cute glaberrima"], olivaceous with minute yellow or more or less orange dots like the feet; anterior

^a For R. Maack, a Russian, who traveled in the Amur region in the early fifties, and who collected the type.

margin of dorsal shield thickened, not tuberculated; posterior marg of sternal shield [plastron] short, semilunar, rounded.

Dimensions.—Length of carapace, 353 mm; greatest width, 306 mm; Habitat.—Found in the southern tributaries of the Amur River especially in the Sungari and Ussuri rivers, as well as in the Amur River itself between the mouths of the tributaries mentioned.

According to Nikolski there are in the St. Petersburg Museus specimens from the above rivers and also from Lake Khank Whether the specimen from Korea (No. 9447) belongs to this for it is impossible to say.

[Genus DOGANIA a (Gray).]

1836. Amyda Bonaparte. Chelon. Tab. Anal., p. 8 (type, Trionyx subplanument of Oken, 1816.)

1844. Dogania Gray, Cat. Tortois. Brit. Mus., p. 49 (type, Trionyx subplanus).

1869. Sarbieria Gray, Proc. Zool. Soc. London, 1869 (p. 200) (type, Trionyx finatus).

The genus Dogania differs from Amyda in having all the pleuraliseparated by the neuralia, while in Amyda the last pair of pleuralisare in contact behind the neuralia. Doctor Siebenrock has recently shown that D. subplana is unique in lacking the median process of the hypoplastron. The head is also comparatively much larger and the body much more depressed, the body being almost concave with no median keel.

The occurence of *Dogania subplana*—or a related species—in Formosa is very problematical. I can not find that any specimens have been examined and the only foundation for the record seems to be the following statement by Mr. Gray: "Mr. Swinhoe informs me that this animal is common in the rivers of China and Formosa. Swinhoe most likely confounded it with *Amyda sinensis*. Befor that time Gray had also catalogued a specimen received from the Leiden Museum as from "Japan," but in Boulenger's Catalogue this specimen is enumerated as from "Java," which is most likely correct.

A description and references are appended, however, in order t facilitate its identification should it really occur in Formosa.

I may add that there is a specimen in the **Hamburg Museur** (No. 110), acquired in 1877 and identified as "Trionyx subplanus. It is said to be from "Japan," but no reliance can be placed on the record.

a \(\) coined word without meaning.

b Sitz, Ber. Akad. Wiss, Wien, Math. Naturw. Cl., XCI, 1902, p. 818.

c Proc. Zool. Soc. London, 1862, p. 265; Ann. Mag. Nat. Hist. (3), XII, 1863, p. 15

d Cat. Shield Rept. Brit. Mus., 1855, p. 69.

Cat. Chel. Brit. Mus., 1889, p. 247.

[DOGANIA SUBPLANA a (Geoffroy-Saint-Hilaire).]

1809. Trionyx subplanus Geoffroy-Saint-Hilaire, Nouv. Bull. Soc. Philom. Paris, I, No. 22, July 1809, p. 366; Ann. Mus. Hist. Nat. Paris, XIV, 1809, p. 11, pl. v, fig. 2 (type-locality "unknown").—Boettger, Offenbach. Ver. Naturk. 24–25 Ber., 1885, p. 135.—Boulenger, Cat. Chel. Brit. Mus., 1889, p. 246 (Malay Peninsula, Sumatra, Borneo, Java).—Flower, Proc. Zool. Soc. London, 1899, p. 619, pl. xxxvi (Penang; Singapore).—Siebenrock, Sitz. Ber. Akad. Wiss. Wien, Math.-Naturw. Cl., XCI, 1902, p. 817, fig. 2 (plastron).—Dogania subplana Gray, Cat. Tortois. Brit. Mus., 1844, p. 49; Cat. Shield Rept. Mus., 1855, p. 69, pl. xxxiii ("Japan"); Proc. Zool. Soc. London, 1862, p. 265 (China, Formosa); 1873, p. 57, fig. 3 (mandible); Ann. Mag. Nat. Hist. (3), XII, 1863, p. 158.

There being no specimen of this species at hand from the territory covered in this work, I append below the diagnosis given by Boulenger in his Catalogue of Chelonians in British Museum, pp. 246-247.

Diagnosis.—Carapace very flat; costal plates eight pairs, the last well developed and separated by the last neural plate; a single neural between the first pair of costals; these plates very finely granulate and vermiculate; a large fontanelle, till late in life, between the nuchal and dorsal plates; epiplastra narrowly separated from each other in front of the entoplastron, which forms an obtuse or a right angle; plastral rugosities scarcely developed, on the hyo- and hypoplastra and on the xiphiplastra; dorsal skin of young with interupted longitudinal ridges; head very large; snout (on the skull) about as long as the diameter of the orbit, which is more than double the interorbital width; postorbital arch extremely narrow, forming a keel on its outer surface; mandibular symphysis shorter than the diameter of the orbit, without median ridge. Brown above, yellowish beneath, and on the sides of the neck; head and neck with yellowish dots; some young with an oblique dark streak behind each eye.

Length of dorsal disk 25 centimeters.

Doctor Slebenrock describes the plastral arrangement of this species as follows (op. cit., pp. 817-819): Entoplastron forms an obtuse angle; epiplastra separated, the anterior straight arm as long as the posterior oblique one; not a trace of a median process of the hypoplastron, so that an undivided membranous fontanelle is formed between the entoplastron and the hyo-, hypo- and xiphiplastra. The plastron of this species is distinguished thereby from that of all other species of Trionyx [Amyda]. The absence of the median process is a very significant character for the determination of this species. Xiphiplastra with short and narrow posterior angles which are separated by a rather broad interspace; xiphiplastral commissure short, on both sides connected by two teeth.

The callosities appear to develop rather late and only to a slight degree, as they are not even indicated on the hyo-hypoplastra of the young, while in equally large specimens of other species they have already reached a considerable size.

Habitat.—Known with certainty only from the Malay peninsula and archipelago. As for its alleged occurrence within our territory see remarks on p. 530.

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In addition to these species described as new he enumerates a few additional ones which Blomhoff evidently had mixed in from his Java collection. Bole himself suspected that the locality of these was wrong, but Blomhoff "convinced him by their manner of preparation that such a mistake had not taken place" (p. 204), a sentence which proves that the specimens were not properly labeled.

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- 1782. HOUTTUYN, M'ARTINUS] —Het onderscheid der salamanderen van de haagdissen in 't algemeen, en van de gekkoos in 't byzonder Verhandel. Genootsch. Wetensch. Vlissingen, IX, pp. 305-336, pl.
- 1871. Humphry, George Murray. The Muscles and Nerves of the Cryptobranchus japonicus. Journ. Anat. Physiol., VI, (pp. 1-61, pls. 1-1v).

- 1865. Hyrt, Josephus. Cryptobranchus Japonicus. | —Schediasma anatomicum, | quod | almae et antiquissimae | Universitati Vindobonensi, | ad solennia saecularia quinta, pie celebranda, | dicat, dedicat, | Josephus Hyrtl, | Rector. | Accedunt quatuordecim tabulae. | —Vindobonae, | apud Guilielmum Braumüller, | Bibliopolamaulae C.R. et Universitatis. | MDCCCLXV. Quarto. x11+132 pp.+x1v pls.
- 1897. IKEDA, S. Notes on the Breeding Habit and Development of Racophorus Schlegelii, Günther. Annot. Zool. Japon., I, Pt. 3, Aug. 10, 1897, pp. 113-122.
- 1902. Ishikawa, C.—Ueber den Riesen-Salamander Japan's. Mitth. Deutsch. Ges. Ost-Asiens, IX, p. 1, Oct. 1902, pp. 79-94.
- 1903. Ishikawa, C. Distribution, oviposition, habits, &c. of the Japanese giant-salamander. (Japanese) Tōkyō Teishitsu Hakubutsukwan, 1903 (II+27+3 with pl.) 26 cm.

Not seen. Title from Int. Cat. Sci. Lit., Zool., 1903, Pt. 3, pp. 120, 123.

1904. Ishikawa, C[hiyomatsu]. Beiträge zur Kenntniss des Riesen-Salamanders. (Megalobatrachus maximus Schlegel). Proc. Nat. Hist. Tokyo Imp. Mus., I, no. 2, pp. 19-37, pls. viii-xi.

The first part of the paper is a general account of the history and habits of this species essentially as in the same author's paper in the Mitth. Deutsch. Ges. Ost-Asiens, 1900, while the second part relates to the egg. egg deposition, and care of eggs.

1882. IWAKAWA, TOMOTARO.—The genesis of the Egg in Triton. Zool. Anz., V, Jan. 91, 882, pp. 10-12.

From studies on the egg of Triton pyrrhogaster Boie.

- 1882. IWAKAWA, TOMOTARO. The Genesis of the Egg in Triton. Quart. Journ. Micr. Sci., XXX (pp. 260-277, pls. xxii-xxiv).
- 1900. Jacobi, Arnold. Verbeitung und Herkunft der höhern Thierwelt Japans. Zool. Jahrb. Syst., XIII, pp. 463–478.

On p. 474 is a brief allusion to the reptiles and batrachians.

- 1903. Kerbert [C.]. Eieren van Megalobatrachus maximus. Tijdschr. Nederland. Dierk. Vereen. (2), VIII (pp. xxviii-xxix).
- 1904. Kerbert, C. Zur Fortpflanzung von Megalobatrachus maximus Schlegel. Zool. Anz., XXVII, Feb. 23, 1904, pp. 305-320.
- 1905. Kerbert, C. Ueber die Eier und Larven von Megalobatrachus maximus Schl. Compt. Rend. Sixth Congr. Intern. Zool., 1904, pp. 289–294.
- 1898. Krefft, P. Demonstration lebender süd-und ost-asiatischer Amphibien. Verh. Ges. Deutsch. Naturf. Aerzte, 69 Vers. Braunschweig, 1897, II, Pt. 1, pp. 187–188.

Habits of Rana buergeri; Triton subcristatus var. immaculiventris, new variety from Klusiu; Triton subcristatus var. typica (Tokyo; Kyoto).

- 1902. Lauber, Hans. Anatomische Untersuchungen des Auges von Cryptobranchus japonicus. Anat. Hefte, XX, (pp. 1-18+2 pls.).
- 1859. Maack, R. Puteshestnie na Amur, sovershennoye po rasporyazheniyu Sibirskago I. Russk. Geograficheskago Obstchestva v 1885 g. S.-Peterburg, 1859.

 Not seen, quoted from Nikolski. Mentioned by Troschel, Arch. Naturg., 1863, II, p. 623, as Reise nach dem Amur von Richard Maack, and according to him there is a list of 14 species of "amphibians" on p. 152.
- 1861. MAACK, RICHARD. Reise im Thal des Flusses Usura. St. Petersburg, 1861.

 Entirely in Russian. Not seen. Quoted from Troschel, Arch. Naturg., 1863, II, p. 623, according to whom there occur 13 species of "reptiles" in the Valley of the Usura [Ussuri], mentioned on pp. 189-193. Two specific names which I have not seen

quoted elsewhere are "Trigonocephalus vittatus n. sp. Brandt" and "Coluber amurensis n. sp. Brandt." They are possibly Agkistrodon intermedius and Elaphe schrenckii, but I presume they are nomina nuda. Neither the work nor the names are quoted by Nikolski in his Herpetologia Rossica (1905).

1866. MARTENS, EDUARD VON. Japanische Reptilien. Preuss. Exped. Ost-Asien, Zool. I, pp. 109-116.

Reptiles and Batrachians: On pp. 152-153 a few "Anmerkungen" (4-6) to the above. The chapter "Die japanische Fauna im Ganzen," pp. 148-151 has a few herpetological remarks on p. 149.

In the "Vezeichniss der gesammelten oder beobachteten Wirbelthiere," pp. 362-410 (not published until 1876) there is reference to the reptiles collected in Japan on pp. 373-383 and to the batrachians on pp. 383-384.

1893. MEURON, PIERRE DE. Sur la grande Salamandre du Japon. Bull. Soc. Sci. Nat. Neuchâtel, XXI, pp. 186-187.

Specimen, 0.75 m. long collected by de Meuron, presented to the Natural History Museum in Neuchatel.

- 1853. MIDDENDORFF, A. TH. von. Amphiben. Sibirische Reise, II, Pt. 2, pp. 247-251, pl. xxvi.
- 1886. MITSUKURI, K. and C. ISHIKAWA. On the Formation of the Germinal Layers in Chelonia. Quart. Journ. Micr. Sci. (n. s.), XXVII, Aug. 1886, pp. 17-48, pls. II-v.
- 1891. MITSUKURI, K. Zool. Mag., Tokyo, III, no. 35, Sept. 1891, pp. 362-368.
- 1893. MITSUKURI, K. On the Process of Gastrulation in Chelonia. (Contribution to the Embryology of Reptilia, IV.) Journ. Coll. Sci. Tokyo, VI, Pt. 3, pp. 227-277, pls. vi-viii.
- 1895. MITSUKURI, K. How Many Times does the Snapping Turtle lay Eggs in One Season? Zool. Mag., Tokyo, VII, no. 85, pp. 143-147.
- 1896. MITSUKURI, K. On the Fate of the Blastophore, the Relations of the Primitive Streak, and the Formation of the Posterior End of the Embryo in Chelonia, together with Remarks on the Nature of Mesoblastic Ova in Vertebrates. (Contributions to the Embryology of Reptilia, V.) Journ. Coll. Sci. Tokyo, X, Pt. 1, pp. 1-118+pls. 1-x1.
- 1905. MITSUKURI, K. The Cultivation of Marine and Fresh-water Animals in Japan. Bull. Bur. Fish. Washington, XXIV, June 17, 1905, pp. 257-289, pls. I-XI.

"The Snapping Turtle, or Soft-shell Tortoise, 'Suppon,'" pp. 260-266, pls. I-III Account of Hatteri's 'turtle farm.'

1887. [Moesch, C.] Der japanische Riesensalamander (Cryptobranchus japonicus) und der fossile Salamander von Oeningen (Andrias scheuchzeri). Neujahrsblatt Naturf. Ges. Zürich, 1887. 4°, 12 pp.+pl.

The third chapter, p. 9, is headed: Der Lebende japanische Riesensalamander in der zoologischen Sammlung im eidgen. Polytechnikum.

- 1881. [Namiye, Motoyoshi].— . . . Classified Catalogue | of the | Specimens of Vertebrates | in the | collections | of | Kiyoiku | Hakubutsukuan | (Educational Museum) | Tokio. . . . | Published by the Educational Museum | . . . | 1881.
- 1898. Namiye, M. Ueber eine wenig bekannte einheimische Schlange der Gattung Achalinus (A. spinalis, Peters). Annot. Zool. Japon., H. Pt. 1, pp. 29-31.
- 1903. Namiye, Motoyoshi. Shikoku-san Hacky-ūrui oyobi Ryōsai-rui. [Batrachia and Reptilia indigenous to Shikoku.] Dōbutsugaku Zasshi, Tokyo, XV, 1903 (pp. 284–286).

Not seen. Title from Int. Cat. Sci. Lit. Zool., 1903, Pt. 1, p. 308.

1889. Nikolski, A. M. Ostrof Sakhalin i ego fauna pozvonotchnikh zhivotnikh. = Zap. Imp. Akad. Nauk, S. Peterburg, LX, Prilozhenie, no. 5. xxv+ 334 pp.

Reptilia, pp. 290-291; Amphibia, p. 292.

- 1896. Nikolski, A. M. Geomolge fischeri Blgr., nazemnij triton iz Ussuriiskago kraya. Annuaire Mus. Zool. St. Pétersbourg, I, 1896, pp. 77-80.

 "Sur le Geomolge fischeri Blgr., triton terrestre de la région du l'Oussouri."
- 1905. Nikolski, A. M. Presmikayustchiyasya i zemnovodniya Rossiiskoi Imperii. (Herpetologia rossica.) Zap. Imp. Akad. Nauk, S. Peterburg (8), XVII, no. 1, pp. 11+518, 2 pls.

Reptilia, pp. 1-331; Amphibia, pp. 332-442; General account of the herpetological fauna and geographical distribution, pp. 442-461; Addenda, pp. 462-495; Bibliography, pp. 496-509.

- 1881. OKABE RIOYEI [The treatment of snake bite]. Tokei Zasshi Osaka, Sept. 5, 1881.

 Not seen. Title from Mitchell and Reichert's Bibliography.
- 1891. Okada, S. Catalogue | of | Vertebrated Animals | of | Japan | by | S. Okada. | Tōkyō, Japan: | Kinkōdō. | 2551 (1891).

 8^{vo}, 22 + 128 pp.

 Batrachia, pp. 65-67, -21 species; Reptilia, pp. 68-72, -32 species.
- 1902. Osawa, G. Beiträge zur Anatomie des japanischen Riesensalamanders. Mitth. Medic. Facult. Tokyo, V, No. 4 (pp. 221-427, 44 pls.).

 Also separate. Tokyo, 1902. 207 pp., quarto + 44 partly colored plates.
- 1881. Peters, W. Ueber eine neue Art von Tachydromus aus dem Amurlande. Sitz. Ber. Ges. Naturf. Fr. Berlin, 1881, pp. 71-72.

 Tachydromus amurensis, new species, p. 71.
- 1897. Phisalix, C. Action physiologique du venin de salamandre du Japon (Sieboldia maxima). Atténuation par la chaleur et vaccination de la Grenouille contre ce venin. Compt. Rend. Acad. Sci. Paris, CXXV (pp. 121-123).

Also in Bull. Mus. Hist. Nat. Paris, 1897 (pp. 242-244).

- 1897. Phisalix, C. Action physiologique du venin de salamandre du Japon (Sieboldia maxima). Atténuation par la chaleur et vaccination de la Grenouille contre ce venin. Compt. Rend. Soc. Biol. Paris (10), IV (pp. 723-725).
- 1897. Phisalix, C. Propriétés immunisantes du venin de salamandre du Japon vis-à-vis du venin de vipère. Compt. Rend. Soc. Biol. Paris (10), IV (pp. 822-823).
- 1860. Pompe van Meerdervoort, J. L. C. [Over den grooten Japanschen Salamander.] Natuurk. Tijdschr. Nederland. Indië, XX, Pts. 4-6, p. 386.
- 1884. Rein, J. J. Reptiles and Batrachians [of Japan]. Japan: Travels and Researches. Translated from the German. New York, Armstrong and Son, 1884, pp. 186–189.
- 1876. Rein, J. J. and Roretz, A. von. Beitrag zur Kenntniss des Riesensalamanders (Cryptobranchus japonicus). Zool. Garten (Frankf. a. M.), XVII, No. 2, Feb. 1876, pp. 33-37, color. pl.
- 1897. Rejsek, Jos. L'histologie de l'œil de Cryptobranchus japonicus. Bibliogr. Anat. Nancy, V (pp. 139-146, 1 pl).
- 1887. Sasaki, C. Some notes on the Giant Salamander of Japan (Cryptobranchus japonicus, Van der Hoeven). Journ. Coll. Sci. Tokyo, I, Pt. 3, pp. 269–274.

1837-1844. Schlegel, H. Abbildungen | neuer oder unvollständig bekannter |
Amphibien, | nach der Natur oder dem Leben entworfen | herausgegeben |
und mit erläuternden Texte begleitet | von | Dr. H. Schlegel, | Conservator des Niederländischen Reichs-Museums etc. etc. | Düsseldorf, | Verlag
v. Arnz & Comp^{nie} | 1837-1844.

Fol. 50 col. plates. Text 8vo, xiv + 141 pp.

The following Japanese species are included: Trionyx japonicus, pl. XXXI; Salamandra nævia, pl. XXXIX, fig. 4; S. subcristata, pl. XL, figs. 1-3; S. nebulosa, pl. XL, figs. 7-10; Emys vulgaris japon., pl. XLI, figs. 1-3; Hyla buergeri, pl. L, fig. 5. All these were probably published in 1844.

The work was issued in parts between the years 1837 and 1844.

First part consisting of 10 plates (pls. I-X) and two signatures of text (pp. 1-32) appeared early in 1837, and was reviewed by Rudolph Wagner in Münchener Gelehrte Anzeigen, IV, No. 127, June 28, 1837, pp. 1043-1044.

The second part, containing the second decade of plates (pls. 21-40) and pp. 33-64, was published apparently in 1839. Sundevall (Årsber. Zool. Arbet., 1837-1840, pp. 183-184: published 1841) speaks of the eleventh decade containing a monograph of the genus Typhlops having been published in 1839, but he has evidently read Decas 11 instead of Decas II.

The rest of this publication was probably issued together in 1844, at least I find no contemporaneous reference to matter contained in this part previous to that year, and Wiegmann, in his "Leistungen" for 1840, 1841, and 1842, does not mention it. In the "Leistungen" for 1843, however, the work is referred to as completed, and the years given as "1837-1844," the same as on the title-page.. The book, therefore, may have been issued complete shortly after the beginning of 1844, as the preface is dated January, 1844. That it did not appear in 1843 seems plain, moreover, from the fact that there is no reference to Schlegel's monographic synopsis of the genus *Draco* (pp. 81-96) in Fitzinger's Systema Reptilium published in that year.

- 1899. Schnee [Paul K. G.]. Einige Notizen über Weichschildkröten. II. Trionyx sinensis, Wiegm. Zeitschr. Naturwiss., LXXII, pp. 202-208.

 Remarks on specimens seen in Canton, Shanghai, and Kobe.
- 1900. Schnee [Paul K. G.]. Ancigtrodon blomhoffi Boie. Zool. Garten (Frankf. a. M.), XLI, Dec., 1900, pp. 395-396.

 Description of color of living specimens.
- 1904. Schoenichen, Walther. Die Brutpflege bei den Amphibien und besonders bei dem japanischen Riesensalamander (Megalobatrachus maximus). Prometheus, XVI. 1904 (pp. 37-40; pp. 52-54.—15 figs.).
- 1895. Sherborn C. Davies, and F. A. Jentink. On the dates of the parts of Siebold's "Fauna Japonica" and Giebel's "Allgemeine Zoologie" (first edition). Proc. Zool. Soc. London, 1895, pp. 149-150.
- 1895. Shiтkov, B. [M.]. Ueber die Fortpflanzung des Isodactylium Schrenki Strauch. Zool. Anz., XVIII, May 6, 1895, pp. 165–168.
- 1900. Shiткov, [B. M.]. Sibirskiya salamandri (Isodactylium Schrenkii Str.) i ikh zhizn na vodie i v akvarii. Dnevnik Otdiela Ikhtiologii Imp. R. Obstch. Akklimat. Zhivotn. i Rast., II, 1900, pp. 41-42.

 Not seen.
- 1902. Shiткov, B. M. Kakogo paltsa nedostaet na konetsnostyakh Isodactylium i na perednikh konetsnostyak Urodela. Izv. M. Obstch. Lyub. Est. Antr. i T. D., XCVIII. Tr. Zool. Otd., XIII. Dnevn. Zool. Otd., III, No. 4, p. 45. Not seen.
- 1906. Siebenrock, F. Zur Kenntnis der Schildkrötenfauna der Insel Hainan. Zool. Anz., XXX, Aug. 28, 1906, pp. 578-586.
 On p. 584 there are three lists of the turtles of Japan, of the Riu Kiu Islands, and

a I am indebted to Dr. Charles W. Richmond for calling my attention to this review.

of Formosa.

1824. Stebold, P. F. de ^a De Historiae naturalis in Japonia statu, nec non de augmento emolumentisque in decursu personatationum exspectandis. Dissertatio, cui accedunt spin flegia faunae Japonicae auctore P. F. de Siebold, Med. Doct. complurium societatum membro. Bataviac, 1824.

Original not seen. Title from the reprint in Oken's Isis, 1827, pp. 135-143. It is stated to be in 4° and to contain is pp.

1826. Siebold, Philippis Franc. Dr. De | Historiae Naturalis in | Japonia Statu | nec non de augmento emolumentisque un decursu perscrutationum ex- | spectandis Dissertatio, cui accedunt Spicilegia Faunae Japonicae auctore Philippo Franc. de Siebold, Medicinae Doctore, Complurium Societatum Membro. Ex Officina Literaria | Car. Phil. Bonitas, Commerc Assessoris Wirceburgi MDCCCXXVI

8°°, 20 pp.
Among the Amphible, p. .8 reference is only a side to Hydrophis Carmenters "mild."

1898. STEINEGER, LEONHARD On a collection of batrachians and reptiles from Formosa and adjacent islands. Journ. Sci. Coll. Tokyo, XII, Pt. 3, pp. 215-225

> Rana longicrus new species, p. 216, Japaiura mitmukurii, new species, p. 218; Emydocephaius ijima new species, p. 223.

1901. STEINEGER, LEONBARD Diagnoses of eight new batrachians and reptiles from the Riukiu Archipelago, Japan. Proc Biol Soc. Washington, XIV. Dec. 12, 1901, pp. 189-191.

Microhyla okinacensis new species, p. 180, Rana narina, new species, p. 180, Rana namiyee, new species, p. 190, Buergeria ejema new species p. 190, Buergeria eichikasen, new species, p. 190, Eulemann yfefferi new species, p. 190, Calumann yfefferi new species p. 191. Disteria arientalis new species, 131.

- 1902 STEINEGER, LEONHARD A new opisthoglyph snake from Formosa. Proc Biol Soc, Washington, XV, Feb 18, 1902, pp. 15-17 Botga krapplini new species p-16
- 1904 STEINEGER, LEONHARD A new species of lizard from the Riukiu Archipelago, Japan Smithson Misc. Coll (Quart Iss.) XLVII, Nov. 9, 1904, pp. 204-205

Takydromus dorsalis, new species, p. 294, type 1 S.N M. No. 34162.

- 1899. STONE, WITMER A small collection of reptiles and batrachians from eastern Mongolia. Proc Phila Acad. Sci., 1899 pp. 183–184 Nine species.
- 1870 STRAUCH, ALEXANDER Revision der Salamundriden-Gattungen nebet Beschreibung einiger neuen und weinger bekannten Arten dieser Familie. Mém Acad Sci., St. Pétersburg 7 XVI No 4 110 pp. 2 pls.
- 1873. STRAUCH, ALEXANDER Die Schlangen des Russischen Reiche, in systematischer und zoogeographischer Beziehung Méin Acad Sci St Pétersbourg (7), XXI No. 4, 288 pp., 6 pls

Particularly important in this connection for its exhaustive treatment of the specimens from Ameriand and the Coast Province. As for the specimens alleged to have been concered in Japan by Consu. Goschkewitsch see pp. 315–118, and 452 of this work.

⁶ Dr. C. L. Reuvens in his doctor dissertation. Die Myoxidae or Schlaefer. 'Leiden, 1890', p. 66, footnote crompare p. 7. makes a carious mistake in ascribing the "De Historiae Naturalis in Japonia Statu" to a G. T. de Siebeld as distinct from P. F. de Siebeld, the author of Fauna Japonica (*G. T. de Siebeld ist nicht zu verwechseln mit P. F. de Siebeld, dem Autor der Fauna Japonica. 'In the Wurzburg reprint of the pamphlet in question now before me it is plainly attributed to the latter. "Auctore Philippo Franc. de Siebeld, Medicinae Doctore."

- 1876. STRAUCH, ALEXANDER. Opisanie presmikayustchikhsya i zemnovodnikh, sobrannikh ekspeditsiei podpolkovnika Przewalskago. In Przewalski's Mongoliya i Strana Tangutov. S.-Peterburg, 1876.
- 1890. STRAUCH, ALEXANDER. Bemerkungen über die Schildkröten-sammlung im Zoologischen Museum der kaiserlichen Akademie der Wissenschaften zu St. Petersburg. Mém. Acad. Sci. St. Pétersburg (7), XXXVIII, No. 2, 127 pp., 4 pls.
- 1863. Swinhoe, R. A list of the Formosan reptiles; with notes on a few of the species, and some remarks on a fish (Orthagoriscus, sp.). Ann. Mag. Nat. Hist. (3), XII, Sept. 1863, pp. 219-226.
- 1835-1838. Temminck, C. J., and Schlegel, H. Fauna Japonica | auctore | Ph. Fr. de Siebold. | Reptilia | elaborantibus | C. J. Temminck et H. Schlegel. | Cum mappa geographico-zoologica et tabulis lithogr. XXVIII. | Lugduni Batavorum. | Ex officin. lithogr. auctoris et typis J. G. Lalau. | 1838.

Fol. xxii + 144 pp. + double page map + ix + 10 + viii plates.

The "Reptilia" of the Fauna Japonica was apparently issued in three separate parts, namely, I Chelonii, II Ophidii, and III Saurii et Batrachii, the plates being numbered separately in each part, but the pagination of the text running on continuously. The publication appears to have been as follows:

1835. Fauna Japonica auctore Ph. Fr. de Siebold. Chelonii. Elaborantibus C. J. Temminck et H. Schlegel. Lugd. Batav. (1835). 80 S. mit 9 unkolorirten Steindrucktafeln in Fol.

The above is the title of the first part, as given in München Gelehrte Anzeiger, II, No. 90, 5 May, 1836, p. 743. It is there stated that Fitzinger's paper on the Chelonians (Ann. Wien Mus., I, 1835) "gleichzeitig mit diesem Theil der Fauna Japonica erschien." On p. 751 a list of the plates 1-9 is given, but no reference is made to the map representing the "Distribution géographique des Chéloniens" which accompanies the bound volume of the Reptilia.

Also reviewed in Wiegmann's Archiv., 1836, II, p. 259, in the "Leistungen" for 1833.

1837. Fauna Japonica auctore Ph. Fr. de Siebold. Ophidii. Elaborantibus C. J. Temminck et H. Schlegel. Lugd. Batav. (1837) S. 81-93 und 1-xxx mit 10 unkolorirten Steindrucktafeln in Fol.

The second part of the Reptilia (third of the Fauna Japonica) is thus quoted by A. Wagner, in the München Gelehrte Anzeiger, V. No. 134, July 7, 1837, p. 41. This part, according to him, contained two different memoirs, the first one, by Schlegel, treating of the Japanese snakes (pp. 81-93 + pls. I-X); the other, by Temminck, giving a review of the faunas of the Sunda Islands and of Japan (pp. I-XXX).

The latter, which is dated November, 1835, but first distributed through the book trade during the Easter "Messe" at Leipzig in 1837, a is evidently Temminck's "Coup d'œil."

Wagner (on p. 55) calls special attention to the Triton japonicus mentioned by Temminek in this work.

This part is also reviewed in Magazine of Zoology and Botany (ed. by Jardine, Selby and John ton), II, 1837, No. IX, p. 266 (published August 1, 1837).

1838. The title page of the entire reptile volume bears this date and may be taken as correct for the publication of the third part, embracing the Saurii and Batrachii (pp. 85-144, pls. 1-VIII). On p. 140, the last page of the text (exclusive of index), is printed

It is a folio of xxx pp., with Temminck's name at the end only. The copy which I examined in the library of the Jardin des Plantes, in Paris, was bound with the mammals of the Fauna Japonica.

a"Diese Abhandlung is vom November 1835 datirt; durch den Buchandel ist sie indesz erst seit des letzten Ostermesse angezeigt und verbreitet." Wagner, München Gelehrte Anzeiger, V., p. 43.

b I have seen only two copies of this memoir, the full title of which is as follows: Coup d'œil | sur la Faune des iles de la Sonde | et de | l'empire du Japon. | Discours préliminaire | destiné à servir d'introduction à la Faune du Japon.

the date "Janv. 1838." In this part was also included Siebold's "Préface suivie d'un aperçu historique et physique sur les reptiles du Japon" (pp. 1-xx1), which is signed "Mai, 1838." As Wiegmann, in his "Leistungen" for 1838 (Arch. Naturg., 1839, II, p. 386), complains that the Royal Library in Berlin had not as yet received the part in question, it is plain that he knew of its publication in 1838. It was reviewed in the "Isis" for October, 1838 (pp. 852-854), hence its appearance must have been between May and October; probably at the "Michaelismesse" (September).

It should be added, for the sake of completeness, that Tschudi, in a letter written not later than August, 1837, from Leiden (printed in Leonhard and Bronn's Neues Jarhbuch für Mineralogie, etc., 1837, Pt. 5, Sept., pp. 545-547) says that "Im 7 Hefte der Fauna japonica ist er schon abgebildet," meaning Schlegel's Salamandra maxima, which is contained in the third part of the reptile volume. There is no doubt that the plates ard possibly also the text of this part were finished in 1837, and we know that Schlegel distributed a few copies of the plate in question during that year, but Tschudi's statement does not invalidate the contention that the part as such was not published until the Michaelismesse of 1838.

It will be seen that the dates of publication of the herpetological parts of Fauna Japonica differ somewhat from those given by Sherborn and Jentink.

They may be tabulated as follows:

Chelonii

1877. TROSCHEL [F. H.]. Ueber Onychodactylus japonicus Bonap. Arch. Naturg. XLIII, Pt. 1, pp. 199-215, pl. xv.

Elaborate history, synonymy, and descriptions of male and female adults, male and female larvæ.

1837. TSCHUDI, J. J. Ueberden Homo diluvii testis, Andrias Scheuchzeri. Neues Jahrbuch für Mineralogie, Geognosie, Geologie und Petrefactenkunde (Leonhard and Bronn, editors, Stuttgart), 1837, Pt. 5, Sept., pp. 545-547.

The generic names Megalobatrachus and Andrias are first proposed in this paper.

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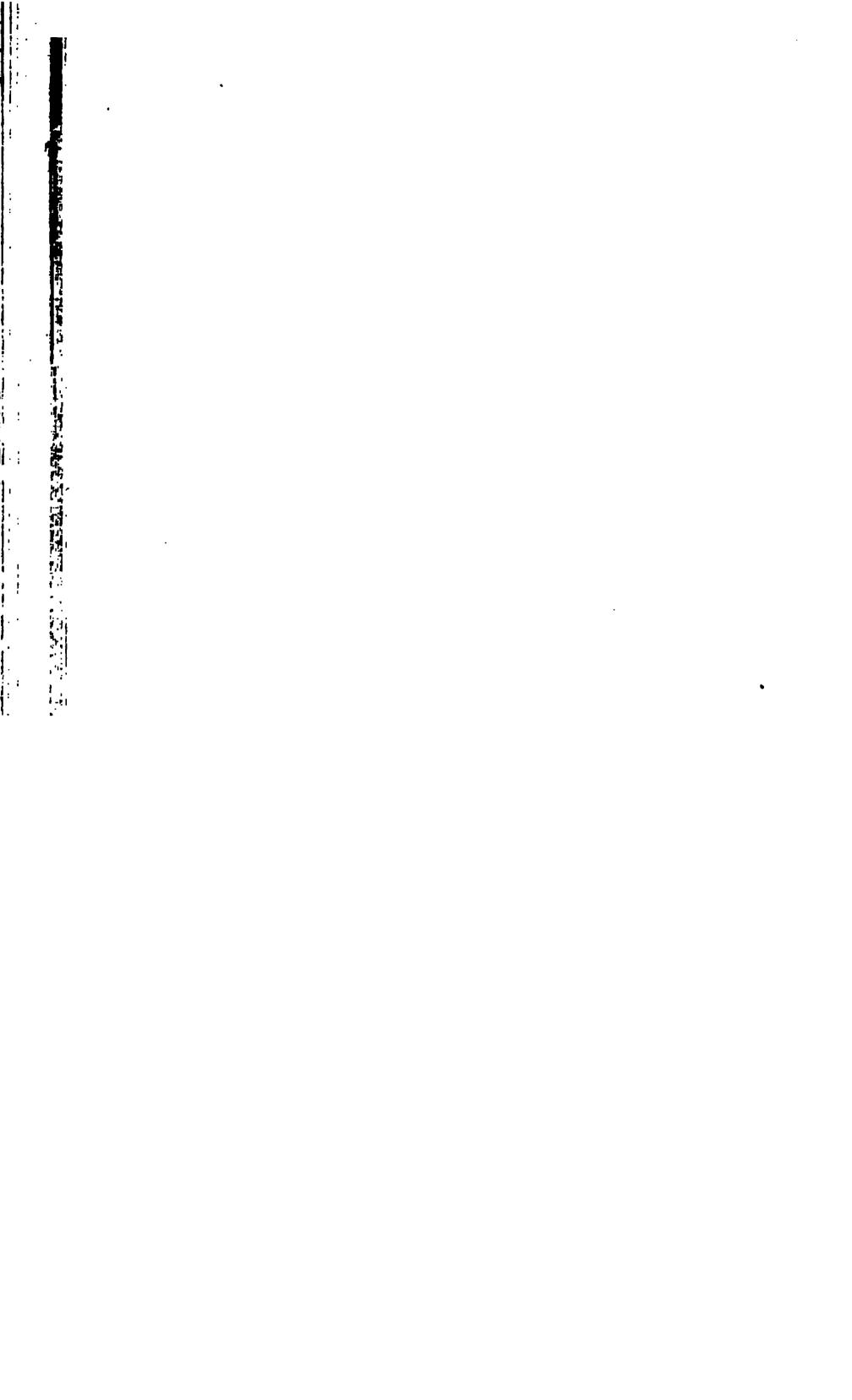
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LIST OF LOCALITIES IN JAPAN PROPER, RIU KIU ARCHIPELAGO, AND FORMOSA, MENTIONED IN THIS WORK, WITH THEIR PRINCIPAL SYNONYMS.

The spelling of many localities is often so different in the various zoological and geographical writings quoted in this work that it seems important to give a list of the various names and their different synonyms, the more so since there is as yet no generally adopted standard spelling, Tokyo and Tokio, Kiusiu and Kyushu, etc., occurring indiscriminately often in the same publication. For this reason no attempt has been made at uniformity in the text of this work.

Agincourt, small island of the northern extremity of Formosa.

Atzu; district in the province of Iwashiro, around the town of Wakamatsu.

Aki, province, near western extremity of Hondo, facing the Inland Sea, capital Hiroshima.

AMAKARIMA, AMAKERRIMA, OF AMAKIRIMA ISLAND, SAIDE BS KERAMASHIMA.

Амамі б-яніма, large northern island of the middle group of the Riu Kiu Archipelago, also known as Öshima (Satsuma, Oho-shima, Oushima, etc.

AMAMI-O-SHIMA: subgroup of the Riu Kiu Archipelago consists of the large Amamio-shima, from which Kakeroma shima is separated by a narrow strait, Tokuno shima, Okinoerabu shima, Yoron shima, and a few smaller islets

Aomori town at the head of Aomori Bay, near Tsugaru Strait, the terminus of the Northern Railway

ASAHIGAWA; river in the San yodo.

Awa; there are two provinces of this name, one, also called Boshū, on Hondo, occupying the end of the peninsula east of the Bay of Tokyo, the other on the east side of Shikoku.

Awan; province embracing the large island at the eastern entranco to the Inland Sea, between Shikoku and Hondo.

Awomori, same as Aomori.

BANGKIMPSING: locality in southern Formosa.

BINGO; province near the western end of Hondo, facing the Inland Sea.

BITCHE, province near the western end of Hondo, east of Bingo, facing the Inland Sea.

BIWA, LAKE, in the province of Omi, Hondo not far from Kyôto. It is 36 miles long
by 12 miles wide. The altitude above the sea is 328 feet.

BIZEN province near the western end of Hondo, facing the Inland Sea, east of Bitchü Bonin Islands, Japanese Ogasawara shima a small archipelage of volcame origin, situated on the 142d meruhan east of Greenwich and between 26° 30′ and 27° 45′ north lat—It consists of three groups, Mukoshima, Chichi shima, and Haha shima.

Boroung Islands, small group in the Northern Pacific, southeast of the Okinawa group, Riu Kin.

Bosno, alternate name for Awa, Hondo

Botel tobago high island situated due east from the southern end of Formosa. Type-locality of Japalura mitsukurii Stepneger.

Buzen; province in northeastern part of Kiūsiū.

Byöritsu; town in northern Formosa near the west coast, 68 miles from Taihoku.

CECILIA ARCHIPELAGO; same as Tokara Group, Riu Kiu.

Chichibu; district in the western corner of the province of Musashi.

CHICHI SHIMA; middle group of the Bonin Islands.

Chikugogawa; river in northern Kiūsiū forming the boundary between the provinces of Chikugo and Hizen.

CHIKUZEN; province in northern Kiūsiū facing the strait of Tsushima.

Chishima, the thousand islands; Japanese name for the Kuril Islands.

CHITOSE FOREST; on the road between Sapporo and Shikotsu Lake, Yezo.

Chusenji, or Chuzenji Lake; near Nikko; it is about 7 miles long by 2½ miles wide, its level being 4,375 feet above the sea.

CLEOPATRA ISLAND; same as Yoko shima.

Coffin Islands; same as Haha shima.

DAGOSHIMA; probably error for Dogashima.

Daibutsu; colossal bronze statue of Buddha at Kamakura, province of Sagami.

Daihoku; same as Taihoku.

DAIPE; same as TAIPA.

DAISEN; volcano in the province of Hoki, 6,050 feet high, the loftiest mountain on the southwest coast.

DECIMA; same as DESHIMA.

DESHIMA; small island in the harbor of Nagasaki, the seat of the Dutch factory.

DEZIMA; same as DESHIMA.

Dōgashima; village near Miyanoshta, Hakone, about 1,300 feet above the sea.

Enoshima; small island in Sagami Bay, connected at low tide by a sand spit with the main island, Hondo.

Erabu shima; one of the islands of the Miyako subgroup, Riu Kiu.

ETCHU; province in the island of Hondo, bordering the sea of Japan just east of the peninsula of Noto.

FAKONE; same as HAKONE.

Fatsizio; same as Hachuō.

FUJI-SAN, also called FUJI-YAMA, or Mount Fuji; in the province of Suruga, 12,390 feet high.

Fusi-yama; same as Fuji.

GILAN, or GIRAN; town on the east coast of Formosa, near the northern end.

Goto islands; a group of islands directly west from Nagasaki, the largest of which are known as Fukue and Nakadori shima.

GREAT LIUKIU, or Loo choo; same as Okinawa shima.

Hachijō shima; southernmost of the Seven Islands of Idzu. It is located in the Kuroshiwo, is about 12 miles long, and the highest point 2,840 feet above sea level.

HAHA SHIMA; southern group of the Bonin Islands.

HAKONE; mountainous district at the base of the peninsula of Idzu, southeast of Mount Fuji. Lake Hakone, with the village at its south end, is 2,378 feet above the sea and about 4½ miles long. Type-locality of Onychodactylus japonicus (Thunberg).

HARBOR ISLAND; same as KIKAIGA SHIMA.

HARIMA; province in the southwestern part of Hondo, at the eastern end of the Inland Sea.

HATA; village in the Hakone Mountains.

HATERUMA SHIMA; southernmost island of the Yaeyama subgroup, Riu Kiu.

HAYAKAWA; river originating in Lake Hakone.

HIDA; province in central Hondo, south of Etchū.

Higo; province in western Kiūsiū facing Shimabara Bay, north of Satsuma.

Hikosan; village and mountain in the province of Buzen, Kiusin. The altitude of the village above the sea is 1 850 feet, that of the mountain 3,850 feet.

HIRI ZEN, mountains in the San-yodo.

HITACHI; province on the east coast of Hondo, northeast of Tokyo.

HIZEN, province in northwestern Kiŭsiŭ, in which Nagasaki is situated.

Hrega; province on the southeast coast of Krüsiü.

HOA-PIN-St; one of the islets forming the Pinnacle group, northeast of Formosa.

HOKI; province in the western end of Hondo, facing the Sea of Japan, opposite the Oki Islands.

Ноккалоб, Japanese name for the island of Yezo and its adjoining administrative dependencies, such as the Kuril Islands.

Ноко-го, Japanese name for the Pescadores Archipelago.

Hökwato; Japanese name of Agincourt Island.

Hondo, or Honsho; main island of Japan, often called Nippon, or Niphon, by earlier writers

IDZU, or IZU; province on the island of Hondo, forming the peninsula east of Tokyo between the bays of Sagami and Suruga.

IDZUMO, or IZI MO. province in the western extremity of Hondo, facing the Sea of Japan, west of Hoki.

IGA; province situated inland in southern Hondo at the base of the peninsula between the bays of Owari and Ösaka.

IHEYA ISLANDS; small cluster of islands northwest of the north end of Okinawa shima, Riu Kiu.

IKI SHIMA, large island off the northwest coast of Kiŭsiŭ, between the latter and Taushima.

INABA; province in southwestern Hondo, facing the Sea of Japan, east of Hoki.

INATORI, town in the province of Idzu, opposite Ō shima, less than 10 miles northeast of Shimoda.

IRIOMOTE SHIMA: largest island of the Yaeyama subgroup, Riu Kiu.

IsE; province in southern Hondo, on the cast side of Owari Bay.

Ishioaki shima; easternmost island of the Yaeyama subgroup, Riu Kiu.

ITIGAWA; river in the province of Tamba.

IWAMI, province in the extreme western portion of Hondo, facing the Sea of Japan IWASHIRO, interior province of northern Hondo, between 37° and 38° north latitude. Izu; same as IDZI.

Izumo, same as lozumo

Jeso, Jesso, or Jezo, same as Yezo.

Јоконама, ваше аз Уоконама.

KAGA, province on the west coast of Hondo, facing the Sea of Japan south of Noto.

KAKEROMA SHIMA, or KAGERUMA SHIMA, island south of Amami-o-shima, Riu Kiu, separated from it by a narrow strait.

KARAPUTO, Japanese name for Sakhalin.

KATONA BHIMA; same as KAKBROMA SHIMA.

KAWACHI; province of southern Hondo, east of Osaka.

Kazi sa, province in Hondo, occupying the basal portion of the peninsula east of the Bay of Tokyo.

KELUNG; port situated near the northern extremity of Formosa.

KERAMA SHIMA, small cluster of islands due west of the south end of Okinawa shima. Riu Kiu, the largest of which is Tokashiki shima.

KIDZI GAWA, or KIZUCAWA, river in the province of Yamashiro, joining the river Yodogawa a short distance south of Kyōto.

Kit, province in southern Hondo, occupying the southern extremity of the peninsula between the bays of Owari and Osaka.

KHRUN; Japanese name for Kelung.

KIKAIGA SHIMA; one of the islands of the Amami-ō-shima subgroup, Riu Kiu.

KILUNG; same as KELUNG.

Kiōro; same as Kyōro.

Kiūsiū, or Kyūshū; extreme southwestern island of the four large ones constituting Japan proper.

KIYOTAKI TOGE; mountain in the province of Kawachi.

Kōbe; large city in province of Setsu, on Ōsaka Bay.

Kōchi; on the southern coast of Shikoku, the capital of the province of Tosa.

KÖRIYAMA; town in the province of Yamato, 3 miles from Nara.

Кото-вно; Japanese name for Botel Tobago.

Krafto; same as Karafuto.

Kuchinoerabu shima; one of the islands of the Osumi group, Riu Kiu.

KUKIEN SAN; Chinese name for Iromote shima.

Kumamoto; capital of the province of Higo, Kiūsiū.

Kunashiri; island off the northeast extremity of Yezo.

Kuro shima; (1) one of the islands of the Ōsumi group, Riu Kiu; (2) one of the islands of the Yaeyama subgroup, Riu Kiu.

Kyōтo; old capital of the Mikado, province of Yamashiro.

Kyūshū; same as Kiūshū.

Lew-chew Islands; same as Riu Kiu.

LINSCHOTEN ARCHIPELAGO OF GROUP; same as TOKARA GROUP, RIU KIU.

LIOUKIOU; French spelling for Liukiu; same as RIU KIU.

LIUKIU; Chinese pronunciation of Riu Kiu.

Loo choo; same as Riu Kiu.

Loo Choo Island, or Great Loo Choo; same as Okinawa shima.

LUCHU; same as RIU KIU.

MEIACOSHIMA; same as MIYAKOSHIMA.

MIACOSHIMA ISLANDS; same as MIYAKOSHIMA ISLANDS as a collective name for the southern Riu Kiu. Same as Saki shima.

MIMAZAKA; a province in the central portion of the western extension of Hondo.

MINO; province in central Hondo between Owari and Echizen.

MIYADUGAWA; river in province of Tamba.

MIYAKESHIMA; middle island of the Seven Islands of Idzu. Not to be confounded with Miyakoshima.

MIYAKO ISLANDS, as a group name often applied to the whole southern Riu Kiu group, or synonymously with Sakishima.

MIYAKO SHIMA; the eastern large island of the Saki shima group, Riu Kiu, with Erabu shima, Tarama shima, and Minua shima, forming the Miyako subgroup.

MIYAZAKI; town on the east coast of Kiūsiū in the province of Hiūga.

Mukoshima; northern group of Bonin Islands.

MURAYAMA; village at the foot of Mount Fuji, on the south side of the volcano.

Musashi; province in Hondo, in which Tokyo is situated.

NAFA; same as NAHA.

NAGASAKI; principal city of Kiūsiū, in the province of Hizen.

NAGATO; province in Hondo, forming the western extremity of this island.

NAHA; capital city of Okinawa shima.

NANGASACKI, and NANGASAKI; same as NAGASAKI.

NAPA; same as NAHA.

NARA; city in the province of Yamato, not far from Kyōto and Ōsaka.

Nase, or Naze; a town and district on Amami-ō-shima, the type locality of Trimere-surus riukianus Hilgendorf.

NEMURO; town at the northeastern extremity of Yezo.

NII SHIMA; one of the northern islands of the Seven Islands of Idzu.

Nikko, mountain district about 100 miles north of Tôkyô, in the province of Shimozuke. In a more restricted sense the name applies to the locality of the mausoleums of the Tokugawa shoguns. The altitude of the latter is about 2,000 feet above the sea.

Niphon, or Nippon; often used by older writers to designate the main island, now known as Hondo

NISHIOMOTE SHIMA; Same as IRIOMOTE SHIMA.

Noro; province on the west coast of Hondo, forming a curved peninsula in the Sea of Japan, about the middle of the island.

OGASAWARA: Japanese name for the Bonin Archipelago.

Оновніма, ваше аз Амамі-б-вніма.

OKINAWA SHIMA; by earlier writers called Great Loochoo, is the largest island of the Riu Kiu Archipelago, situated about halfway in the chain of islands between Kiusiu and Formosa.

OKINAWA STROKOUP, RIU Kiu, comprises the southern islands of the middle group, of which Okinawa shima is the largest. Many other islands belong to this subgroup, some of them forming minor groups such as the Kerama cluster and the Iheya cluster.

OKINOERABU SHIMA; one of the islands of the Amami-o-shima subgroup, Riu Kiu.

ÖMACHI, village in the northern part of the province of Shinshiu, not far from the boundary of the province of Etchu.

OMAYA SAKI, or OMAEZAKI, province of Totomi, the promontory marking the western end of Suruga Bay.

OMI; province in southern Hondo, surrounding Lake Biwa.

ONOMICHI; city on the inland sea in the province of Bingo.

ONSEN, mountain near Shimabara, province of Hizen, Kiusiu. Type-locality of Tachydromus holsti.

OOSHIMA, SEING AS AMAMI O-SRIMA,

OBAKA, large city in southern Hondo at the mouth of the Yodogawa.

OSAKIGAWA; river in southern Hondo, in the provinces of Mimazaka and Harima.

QREN. MOUNT, erroneous for MOUNT ONSEN.

Ō-shima; common name for various islands, the principal ones being Vries Island or Idzu-no-Oshima, and Amami-ō-shima, also known as Ō-shima (Satsuma) and by older authors as Oushima, Ohoshima, etc.

Oshima-Orinawa Group, large middle group of the Riu Kiu Archipelago, subdivided into the northern Amami-o-shima subgroup and the southern Okinawa subgroup.

ÖBUMI, a province in Kiûsiû at the southeastern extremity of the island.

Osumi Group of the Riu Kiu curve comprises the larger islands south of and nearest to Kiusiu, to which they seem to belong biotically and geologically, the principal ones being Tanega shima, Yaku shima, Kuchinoerabu shima, and Kuro shima. Ousima, same as Amami-ö-shima.

OWARI, province on the south coast of Hondo, at the head of the deep Owari Bay.

OYAMA, province of Sagami, a celebrated mountain, 4,150 feet high, about 22 miles due west of Yokohama. Also the village at the foot of the mountain,

PARRY GROUP, Same as MI KOSHIMA.

PA-TCHUNG-BAN: Chinese name for Ishigaki shima.

PEEL ISLAND; same as CHICHI SHIMA.

Pescapores, small group of Islands on the West coast of Formosa, on the Tropic of Cancer. Japanese name Höko-tő.

PINNACLE GROUP, number of small islands northeast of Formosa and north of the Saki shima group, Riu Kiu, the principal island being Hoa-pin-su.

PORT LLOYD; same as Chichi shima.

RALOT SIMA, see p. 23 of this work.

RIU KIU; Japansese pronounciation of the name of the chain of islands between Kiūsiū and Formosa, known otherwise as Liukiu, Loo Choo, Luchu, Lioukiou, etc. The Riu Kiu curve naturally falls into four main groups from north to south as follows: Ōsumi group, nearest Kiūsiū; Tokara group, or Linschoten Archipelago; Ōshima-Okinawa, or middle, group; and Saki shima, or southern group. The Ōshima-Okinawa group falls again into two subgroups, the Amami-ō-shima subgroup and the Okinawa subgroup. The Saki shima group also subdivides into the Miyako subgroup and the Yaeyama subgroup. In addition some outlying groups and islets are referred to the Riu Kiu Archipelago, such as the Pinnacle group and the Borodino group.

For the islands composing these groups see under name of each of the latter.

ROKAGAWA; river in western Mino.

SAGALIEN; Same as SAKHALIN.

SAGAMI; province in central Hondo, at the western entrance to Tokyo Bay.

SAGARA; Totomi province.

SAGHALIEN; same as SAKHALIN.

SAKHALIN; Russian name for the large island to the north of Yezo, the southern half of which again belongs to Japan since 1905.

Saki shima group; southern group of islands of the Riu Kiu curve, composed of the Miyako and Yaeyama subgroups.

San-indo; name of the district occupying the Sea of Japan slope of the western extension of Hondo, in contradistinction to San-yodo, embracing the Inland Sea provinces.

San-yōdō; district occupying the Inland Sea slope of the western extension of Hondo. Sapporo; capital of Hokkaidō, in the interior of Yezo.

Sasayama; village in the province of Tamba, 60 kilometers west-northwest of Kyōto; altitude 250 meters above sea.

Satsuma; province occupying the southwestern extremity of Kiūsiū.

SENDAI; large city in the province of Rikuzen, northeastern Hondo.

Sendai; small town in the province of Satsuma, Kiūsiū.

SETA; village near south end of Lake Biwa.

SETANAI; village in the province of Shiribeshi, west coast of Yezo.

Setsu, or Settsu; province in Hondo, at the head of Osaka Bay. The cities of Kōbe and Ōsaka are located in this province.

SEVEN ISLANDS OF IDZU; series of volcanic islands stretching north-south from the province of Idzu. The principal islands comprising this archipelago are: Ö-shima or Vries Island; Nii shima; Miyakeshima; and Hachijō shima.

Shikoku; fourth of the principal islands of Japan, bounding the Inland Sea on the south.

Shikotsu Lake; crater lake about 20 to 30 miles in circumference, about 39 miles from Sapporo, Yezo.

Shima; province in Hondo at the western entrance to Owari Bay.

Shimabara; town in the province of Hizen, Kiūsiū, at the entrance of Shimabara Bay, not far from Nagasaki.

Shinshië, or Shinshë, also called Shinano; inland province in central Hondo, east of Hida and Mino.

Shiribeshi; province on the southwest coast of Yezo.

SHURI; town on Okinawa shima.

SIMODA, or SHIMODA; town in the province of Idzu.

SUDZAKA YAMA; mountain in southern Hondo, where the boundaries of the three provinces of Ise, Iga, and Omi meet. Type-locality of Megalobatrachus japonicus Temminck).)

SULPHUR ISLAND; same as Tori shima.

Sumiyoshi; famous temple 3½ miles from Ōsaka.

SURUGA BAY; deep indentation on the south coast of Hondo, west of the peninsula of Idzu.

Suwo; province near the extreme western point of Hondo, facing the Inland Sea.

Suzuga yama; same as Sudzaka yama.

TAIHOKU; Japanese name for Taipa or Taipe, especially the inner walled portion of the town.

TAINAN; same as TAIWAN-FU.

TAIPA, or TAIPE; Japanese TAIHOKO, the capital of Formosa, near the northern extremity of that island.

TAIWAN; Chinese and Japanese name for Formosa.

TAIWANFU; former name of TAINAN, the capital of southern Formosa, on the west coast of the island under 23° North latitude.

TAJIMA; same as TAZIMA.

TAKAO; port in south Formosa, south of Taiwanfu.

TAKOW; same as TAKAO, Formosa.

Tamba; province at the base of the western extension of Hondo, not far from Kyōto and Ōsaka.

Tamsui; seaport near the northern extremity of Formosa.

TANEGA SHIMA; one of the islands of the Ösumi group, Riu Kiu.

Tango; province near the base of the western extension of Hondo, facing the Sea of Japan.

TAZIMA; province on the western extension of Hondo, west of Tango, and facing the sea of Japan.

Tchi-tchi-shima; same as Chichi shima.

TOKARA GROUP; a series of small islands in the Riu Kiu Archipelago between Yaku shima and Amami-ō-shima. The southernmost island of this group is Yoko shima.

Tokuchimura; village on the west side of Okinawa shima, the type-locality of Callophis boettgeri Fritze.

Tokuno shima; one of the islands of the Amami-ō-shima subgroup, Riu Kiu.

Tōkyō; capital of Japan.

Tori shima; small, volcanic island, lying due west of Tokuno shima, of the Amamiō-shima subgroup, but geologically reckoned to the Okinawa subgroup, Riu Kiu.

Tosa, or Toza; province in Shikoku, occupying nearly the entire southern coast of the island.

Totomi; province on the south coast of central Hondo, between Suruga Bay and Owari Bay.

TOYOKAGAWA; river in the province of Tazima.

Toza; Same as Tosa.

TSUKUBA MOUNTAIN; northeast of Tokyo, in the province of Hitachi.

TSU-SHIMA; two large islands in the strait separating Japan from Korea.

Unzen-dake; same as Mount Onsen.

Vries Island; same as Ō-shima, Idzu.

WAHEIZAN; Japanese name for Hoa-pin-su.

YAEYAMA ISLAND; same as Ishigaki shima.

YAEYAMA ISLANDS; subgroup of the Saki shima group, consisting of the Ishigaki shima, Iriomote shima, Yonaguni shima, Hateruma shima, etc. Sometimes used in the same sense as Saki shima, thus including M'yakoshima.

YAKU SHIMA; one of the islands of the Osumi group, Riu Kiu.

Yamagawa; town in the province of Satsuma, at the western entrance to Kagoshima Bay near the south end of Kiūsiū.

YAMASHIRO; province in southwestern Hondo, in which Kyōto is situated.

Yamato; province in the center of the large peninsula of southwestern Hondo, between the Bays of Owari and Ōsaka.

YAYEYAMA; same as YAEYAMA.

YEDO, or YEDDO; old name for Tokyo. By a curious mistake the locality Yedo on old labels, or in museum catalogues has several times been corrected to Yezo, causing great confusion.

YEZO, or YESSO; northernmost of the four principal islands of Japan. It is a geographical term applied to the island alone and is consequently not exactly synonymous with Hokkaidō.

Yodogawa; river in southwestern Hondo, draining Lake Biwa, and emptying into the Bay of Ōsaka.

YOKOHAMA; large city at the entrance of Tōkyō Bay.

YOKO SHIMA, Or YOKOATE SHIMA; southernmost island of the Tokara group, Riu Kiu.

Yonaguni shima; westernmost island of Yaeyama group, Riu Kiu.

Yoron shima; southernmost island of the Amami-ō-shima subgroup, Riu Kiu.

Yuмото; watering place, near Nikko, north of Chüzenji Lake, about 5,000 feet above the sea.

EXPLANATION OF PLATES.

PLATE I.

Sketch map of Japan and adjacent territory.

PLATE II.

Figs. 1-3. Diemictylus pyrrhogaster, fig. 1, animal from above; fig. 2, from the side; fig. 3, from below. Natural size. From Schlegel, Fauna Japonica, Saurii et Batrachii, pl. 1v, figs. 1-3.

PLATE III.

- Figs. 1-3. Hynobius nævius, fig. 1, animal from side; fig. 2, anterior portion of animal from below; fig. 3, from above. Natural size.
 - 4-6. Hynobius nebulosus, fig. 4, anterior portion of animal from below; fig. 5, from above; fig. 6, entire animal from side. Natural size. From Schlegel, Fauna Japonica, Saurii et Batrachii, pl. 1v, figs. 4-9.

PLATE IV.

- Figs. 1-3. Hynobius lichenatus, fig. 1, animal from above; fig. 2, from below; fig. 3, open mouth. From Boulenger, Ann. Mag. Nat. Hist. (5), XII, 1883, pl. v, figs. 1-1b.
 - 4-7. Hynobius peropus, fig. 4, animal from above; fig. 5, from below; fig. 6, head from side; fig. 7, open mouth. From Boulenger, Cat. Batr. Grad. Brit. Mus., 1882, pl. 11, figs. 1-1c.
 - 8. Hynobius leechii, open mouth. From Boulenger, Ann. Mag. Nat. Hist. (5), XIX, 1887, p. 67.

PLATE V.

- Figs. 1-4. Onychodactylus japonicus, fig. 1, larva; fig. 2, fore foot; fig. 3, hind foot; fig. 4, toe with nail, from side. From Schlegel, Fauna Japonica, Saurii et Batrachii, pl. v, fig. 4.
 - 5-6. Geomolge fischeri, fig. 5, adult animal from above; fig. 6, open mouth. From Boulenger, Proc. Zool. Soc. London, 1886, pl. xxxix, figs. 2 and 2b.
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PLATE VI.

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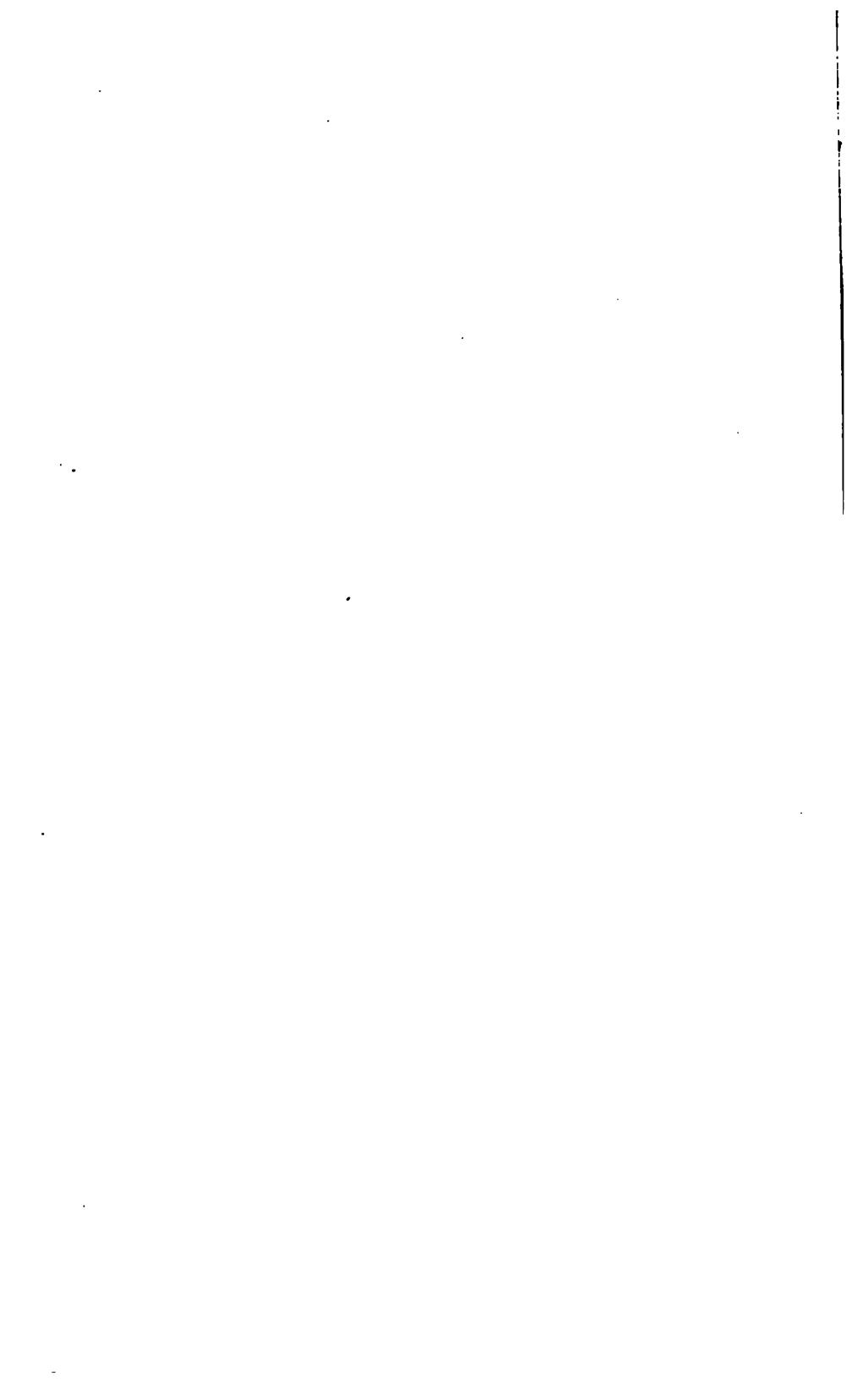
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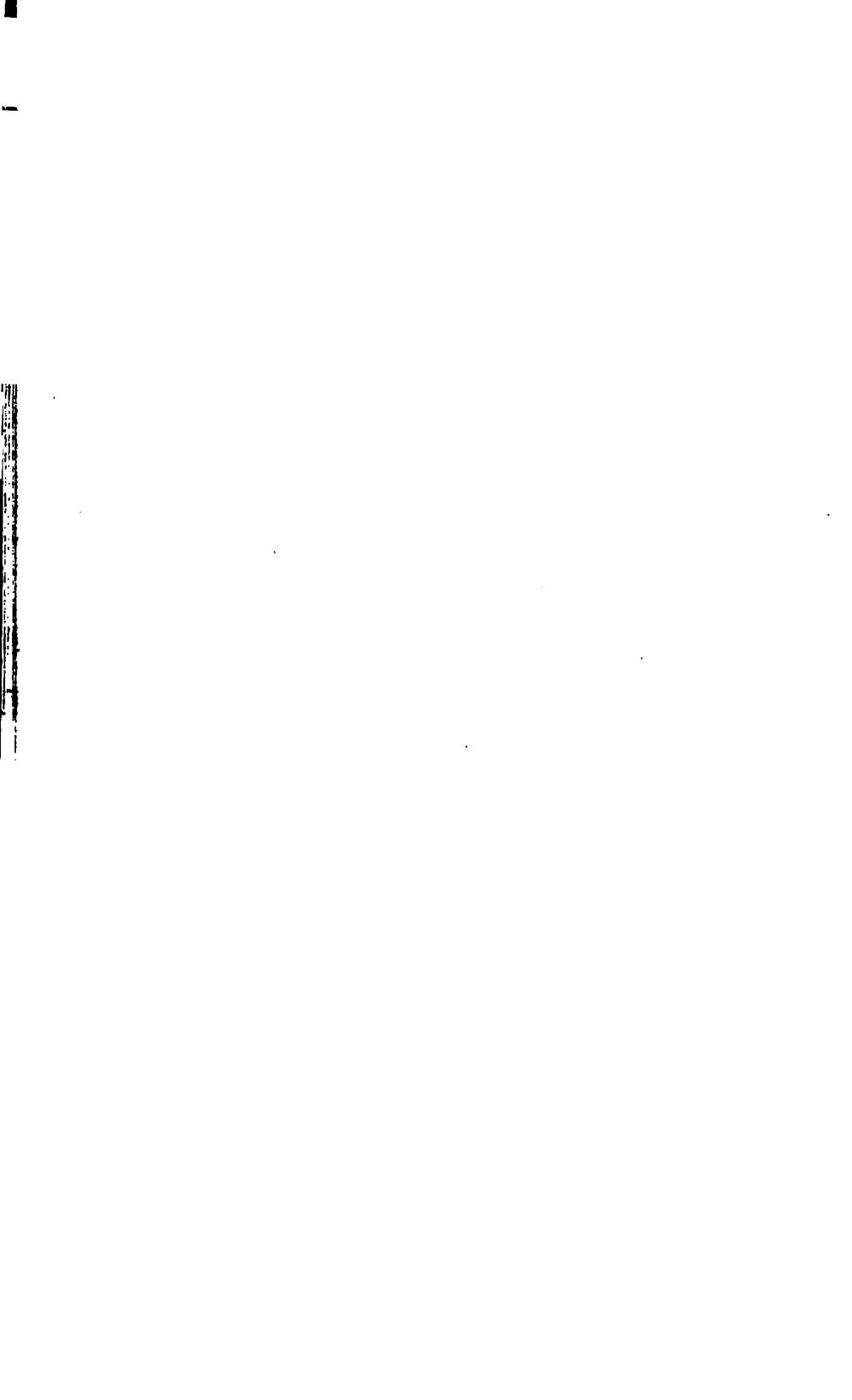
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